ARCHITECTURAL SKETCHING & DRAWING IN PERSPECTIVE

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WITH THIRTY-SIX PLATES, ILLUSTRATING THE DRAWING OF ARCHITECTURAL DETAILS AND SKETCHING TO SCALE; INCLUDING CHAPTERS ON THE PLAN AND MEASURING POINT METHODS, THE SIMPLIFICATION OF PERSPECTIVE BY R.'S METHOD, AND ON FIGURES, FOLIAGE, &c.

By

H. W. ROBERTS

AUTHOR OF "R.'S METHOD OF PERSPECTIVE"
"RHYTHMIC DESIGN," "PANORAMA DRAWING"

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INTRODUCTION

THE Laws of Perspective, if properly understood, will enable one from any desired position to make a correct scaled representation of a building or other object from the geometrical drawings, so that its appearance can be judged before it is constructed; further, they will considerably help the sketcher to make an accurate representation of any building or other object already in existence; and will considerably enlarge an architect's power of design. One might then reasonably expect to find these laws thoroughly understood by architects and other designers. The authorities who regulate the complicated teaching of this subject would be very disappointed with the meagre results they have produced if they only knew what the author of R.'s method has found out for himself in a journey taking four years, and a second journey taking eight years, spent in visiting the architects of Great Britain in their own offices, for, while most architects know something about it, but very few are sufficiently familiar with the subject to use it to advantage, and the bad grammar of perspective is evident in the exhibited works of even our most learned architects.

The teaching has evidently been at fault, and we naturally look for some more certain way of acquiring this useful subject. In lecturing on this subject I have found R.'s method so interesting and attractive to students, that nearly every one grips it at sight, and by almost playing with the diagrams they get to understand the correct drawing of simple forms, and are eager for the solution of more complicated problems. The method has been very generally accepted as a great time-saver, and is growing in popularity. I have received most complimentary letters from some of the best known experts in perspective drawing expressing their approval of it. Besides architects, some of the large decorating and manufacturing firms are using it, and the technical and art schools are beginning to teach it.

Squares, octagons, circles, and other simple forms are analysed, first on ordinary squared paper; these, together with lines at any angle, can be then drawn in perspective at sight.

I have shown the best known old methods of working problems, and their very much simplified uses over my diagrams; and I have further shown several new methods of procedure that are the outcome of further investigation of problems by this method.

I have also given several rapid ways of drawing forms that are not strictly mathematically correct, and yet meet all practical requirements for perspective drawing.

Any one can understand this easy and effective course of Perspective Drawing, and cannot fail to find it of the greatest assistance and value; and those who already use R.'s method will find its possibility fuller and of wider application than they had imagined.

All one has to do is to tear out the specimen diagram at end of this book (bound in, but perforated for easily tearing out), and place it between a double sheet of semi-transparent paper and clip same secure with one or two wire paper fasteners.

A quire of imperial paper, sufficiently transparent, such as artificial parchment, or other cheap paper, can be bought at a paper merchant's; these sheets, when cut into four and doubled, will be the right size for diagrams.

The illustrations of this book were drawn over the diagrams; these can be used as exercises as often as possible to familiarise one with the method of working problems in elementary perspective.

The usefulness of R.'s method has so extended that it is proposed to publish this second edition very similar to the first edition, and then to prepare a second advanced volume to still further carry the advantages into advanced design and drawing.

In this advanced volume will be given a chapter on R.'s method of Panorama Drawing for military purposes, showing a method the author has been fully occupied teaching to officers during the war, enabling them to make accurate sketches after first lesson.

I

CUBES, SYMPATHETIC LINES, COTTAGE FROM DICTATION

The original drawings for the plates were made over the diagrams of R.'s "Method," 6th edition; the particular diagram is indicated in a short description on a folded sheet at the end of each chapter; by placing the proper diagram under the plate, which is specially printed on transparent paper, the construction is made evident. Diagram A represents the two near sides of an object standing upright on the ground in such a position that its sides make angles of 30° and 60° with the picture plane.

The picture plane is an imaginary large sheet of glass, through which you see an object; it much simplifies matters if it is supposed to touch the nearest corner of the object; we can, however, bring it nearer to the spectator, and get a smaller view. Or, we can take it farther away, and get a larger view. In R.'s diagrams the picture plane touches the nearest corner of the object. The small black triangle at the top of diagram 3 shows the nearest corner of the object, and the angle at which it is seen. The spectator's eye is supposed to be immediately opposite this near corner at right angles to the plane of the picture, and at the height of the horizontal line which is marked HL. The horizontal line can be high or low. If the spectator is standing, it is generally taken at 5 feet high; if he is sitting, at 3 feet 6 inches, and so on. Set out all heights from this line upwards, or downwards. The two sides, or planes, are divided by the thicker lines into squares of eight parts of perspective height and eight parts of perspective width, so each space between the thin lines is 1 in height and 2 in width. Each alternate upright line is left out so that the lines are not too close to be read. It is most important to remember that each space is 1 in height and 2 in width.

The main lines required in a perspective drawing of any object are vertical (upright), sympathetic (going to vanishing points), and horizontal lines (parallel with the HL. in parallel perspective).

Plate 1.—From the very commencement these lines should be practised, the sympathetic requiring the most attention. Place a sheet of transparent paper over diagram A, and take any three pens of different degrees of fineness, and draw a cube in perspective, from 8 to 16 on the nearest corner, using the finest pen for the flat side, the medium pen for the other side, and the coarse pen for the under side; using sympathetic

lines for the sides of the cube, and vertical lines for the under side, and putting about three intermediate lines between each sympathetic thin line on diagram. Get the remote edges of the cube by carefully drawing sympathetic lines A and B, using a transparent celluloid set-square or straight-edge to lightly pencil in the lines, then with the coarse pen mark in the under side with regular vertical lines.

Use any sort of pen that pleases you most, but get an even grey tone as the result, being very careful that the lines begin and end at the exact position, so as to properly suggest the form you are indicating. I use Gillott's 303 for fine work, 404 for medium work, and any coarse pen for the thick lines, but do not suggest they are better than any others. I know many men use special pens, and advise special makes, but if there is any real advantage, it certainly does not come in at this stage; of course, all the different lines can be done by pressure on a fine pen, but for this class of elementary work it is much better and easier to have graded pens and use them all lightly, letting them give their own natural thickness. The life of a fine pen is not long; a pen must be often renewed and kept in good order if you wish to do good work.

When the cube is finished, draw another on each side at the same perspective height, having the vertical lines 24 as the nearest corners; finish these in the same manner with shading lines, then draw under these three cubes similar forms but only two spaces in height; you will get the tops of these forms showing instead of he bottoms. Keep the tops white paper. This sort of subject can be very much varied by drawing simple cube forms in varying positions over the other diagrams; if the same study is made over diagrams B and C you will see how the angle at which an object is viewed will alter the appearance of it.

Those who simply want form without penmanship can draw in the outlines only with pen and pencil, instead of using shading lines, but if these full instructions are carried out, the student will get an introduction to pen and ink shading.

Plate 2 is drawn over diagram C, and represents a corner of brickwork drawn to a larger scale; it will form another good exercise for sympathetic lines; you will notice the large scale drawing represents a portion of wall about $7\frac{1}{2}$ inches below and 30 inches above the HL.

Plate 3.—For class instruction this plate can be reproduced by dictation, each student having placed diagram B between a folded sheet of transparent paper. Let each space represent 1 foot in height and 2 feet in width, this will make a drawing of $\frac{1}{4}$ inch scale; each $\frac{1}{4}$ inch space on the nearest corner will represent 12 inches of actual size (so $\frac{1}{4}$ inch scale means $\frac{1}{48}$ of real size); mark a ground line 5 feet below the HL.; from the nearest corner on the front (on the longest side of diagram) tick 6 feet of wall (*i.e.*, three

divisions), 6 feet of window, 4 feet of wall, 4 feet opening for door, 4 feet of wall, 6 feet of window, and 6 feet of wall; this should bring you to line 36; now, measuring the heights from the ground line, tick 3 feet high to the window openings, 4 feet height of window, 5 feet 6 inches of wall to bedroom window, then 3 feet 6 inches for height of window; this will also be the eaves level, 16 feet from the ground. The widths of the bedroom floor can now be ticked; 6 feet of wall, 6 feet of window, 12 feet of wall, 6 feet of window, and 6 feet of wall; now make the cottage 24 feet wide (*i.e.*, twelve spaces), carry up the near and distant corners of house to same height, 16 feet, and connect the top points. To get gable at side of cottage we carry up from the 12-feet tick a vertical line 12 feet high; this will give a square pitch roof (for tiling); from the apex to the top points on corners draw the slopes of the gable; you will notice these slopes run diagonally through square spaces (that is 2 spaces in height to 1 in width). By drawing sympathetic lines through Y, the distant angle of front, and X, the centre of near gable, you get an intersection Z, which is the point immediately under the apex of distant gable. A vertical line through this point intersects a sympathetic line through near apex, and gives the exact point of distant apex. Join this point to Y, and you get the slope of distant gable. Now tick centre of nearest bedroom window, and draw a gable over same 10 feet wide and 5 feet high, and repeat the operation over the other bedroom window. You will again notice all these slopes will pass through the angles of squares, they being lines of 45° inclination. From the apex of near small gable draw a sympathetic line representing ridge, and repeat the operation at other small gable, then continue a line through each apex to the nearest angle; from this tick draw sympathetic line to nearest slope of main roof, which is ticked at the level, the small ridges will cut roof; from this point run a sympathetic line along main roof, and you get this level transferred to each short ridge; the valley lines can now be drawn in.

You have now found, in true perspective, the two main planes and all the details thereon; the roof slopes; and the valley slopes; these sloping lines bounding the planes would, if continued, vanish in their vanishing points. At a later stage you will thoroughly understand all about the finding of these points, but at present, by use of the diagrams, you can draw correctly without them, and get results in agreeable perspective instead of the very distorted results that are necessitated by using the ordinary methods on a small sheet of paper.

The architect's plan method and the School of Art measuring point method require equally large sheets of paper and enormous drawing boards to work a perspective of a simple building, but R.'s method is worked on a small sheet. To show the first two methods on a small sheet of paper, perspective must either be of a scale so small as to be useless, or the result must be seriously distorted. R.'s method allows you to draw to any scale and without distortion.

Plate I.

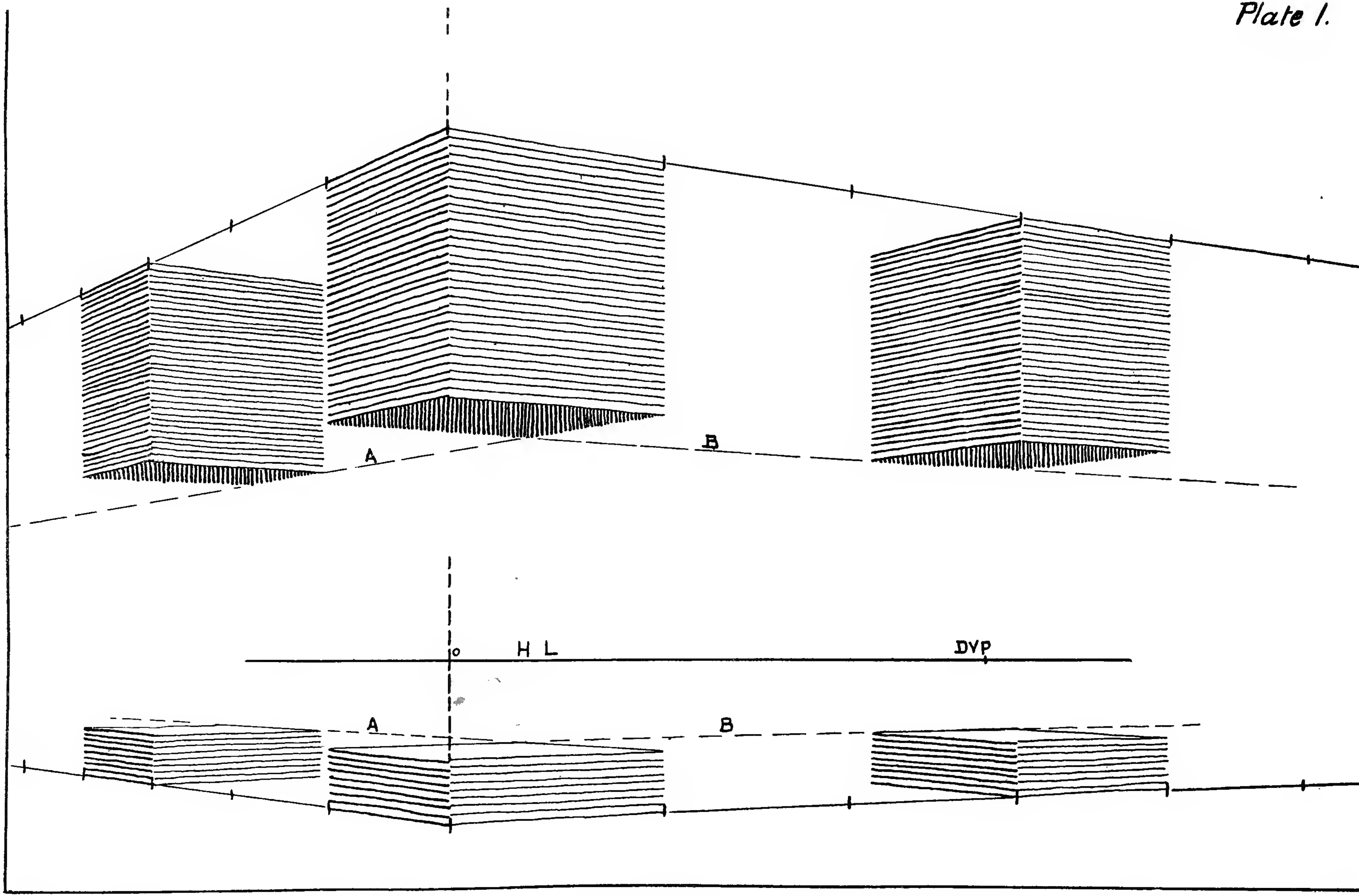
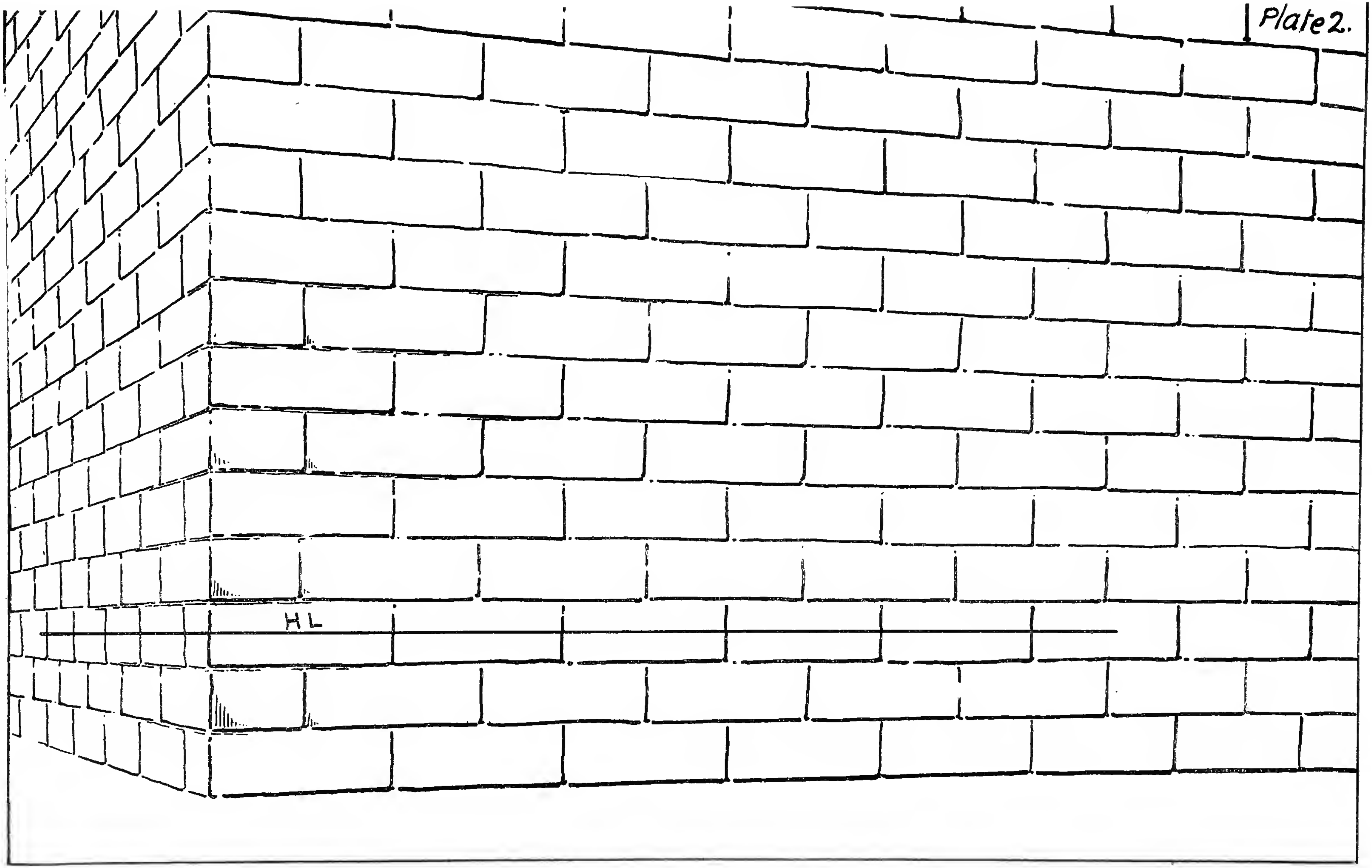
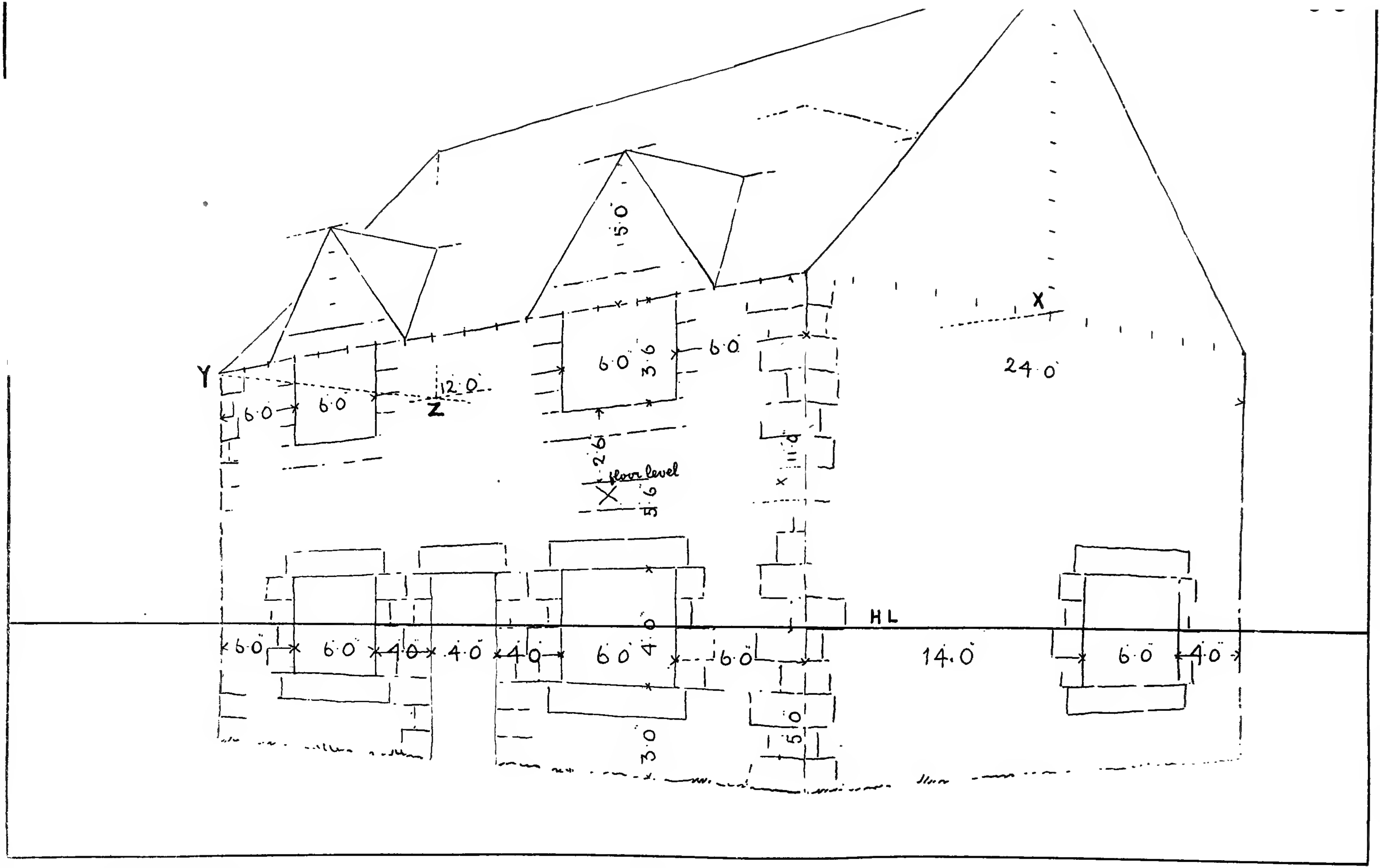


Plate 2.




Y
X
Z
HL
24·0
14·0
12·0
5·0
6·0
3·6
2·6
floor level
5·6
11·0
4·0
3·0

II

POSITION OF SPECTATOR—HORIZONTAL LINE—PICTURE PLANE—VANISHING PLANES—DVP

You must stand sufficiently far away from any object to get a pleasant view of it, for the eye can only see what is within an angle of say 60°, and even then the parts more remote from the centre of vision are distorted. There are many rules, more or less complicated, on how to decide on the station point. I have always used the very old law, of getting about three times the height away, *i.e.*, I let the nearest point of the object I am drawing be three times as far from me as the object is high; and I find it a safe rule for all ordinary buildings. It is, perhaps, easily remembered in this form:—"Estimate the height of the object in feet, and then from nearest corner stride away the same number of strides (yards) to the station point; mark this point, then keep about this distance away, and find a point where the mitre of the cornice, string course, or plinth is upright; then you are at 45°, 45°, or, rather, the building makes these angles with the picture plane; fix this point, and stride to such a point from which you can sight or bone either the front or side, and count your strides (say thirty). Now return; at the tenth stride you will be at station point for 15°, 75° diagram; at the twentieth stride you will be at station point for 30°, 60° diagram; and at the thirtieth stride you will be again at the station point for the 45°, 45°."

The most important line on the picture plane is the HL., and this should be thoroughly understood. Wherever you may be standing or sitting it is a line at the level of your eyes; it is perhaps best seen by the sea. When you stand at the water's edge there it is right in front of your eyes, at a level of about 5 feet from the ground you stand on; the sea seems to go up to it, the sky seems to come down to it. Go up the shore or cliff a few feet, this line has gone with you, the sea and sky again join at it; your eyes are perhaps 10 feet above the level of the water at the nearest point; so is the HL., and when you have mounted so that your eyes are 50 feet above the first station point, the HL. is still level with your eyes. The law is the same everywhere, but at the sea it is more evident. Now go down to the water's edge again; there are several small boats, similar in size, some near, some distant; the one nearest you seems about 2 feet out of the water, then there is 3 feet of water showing above them; the distant boats seem very much smaller, but whatever the boat shows in height, the space of water above the boat to the horizon will show one and a half times as much. When you see the boats from a higher level, the nearest boat is perhaps $\frac{1}{10}$ of the height to the HL., and the water above $\frac{9}{10}$; then every distant boat, if similar in size, will show $\frac{1}{10}$ of the height to the HL., and the water above $\frac{9}{10}$.

The following rule for roughly estimating how many miles along a level surface we can see from a fixed height is worth knowing for estimates for drawing purposes: "Add the height to the height, and take square root of the sum, the result giving miles distant we can see an object on level ground; thus, at 6 feet high we see $5+5=10$ $\sqrt{10}=3{\cdot}16$ miles; at 100 feet high we see $100+100=200$ $\sqrt{200}=14{\cdot}14$ miles."

The picture plane on which we imagine the horizontal line and vanishing points is, of course, only the sheet of glass on which we indicate a line that covers the real horizon, and the points that cover the real vanishing points that are miles away on the real horizon.

Plate 4.—Put diagram A in a double sheet of transparent paper, and in some manner carefully clip same; draw something just under 20 feet in height; the spectator will be 60 feet away from the nearest corner. Draw a ground line 5 feet below the HL. (let each space in height equal 1 foot) to $\frac{1}{4}$ inch scale; make the front 40 feet long, the side 20 feet, and the height 18 feet, draw in the HL., and carefully mark the point DVP. Mark the nearest corner AB, and the other corner of end CD, and mark the other end of front A′B′; now ABB′A′ will represent the front, and ABCD will be the side of the object, which we will make into outline of a house. Notice AD and BC get nearer as they get more distant, and if continued will meet in the HL., at in this case a distance of about $8\frac{3}{4}$ inches from the nearest corner; this is the vanishing point, VP., for them and all other lines going in the same direction, or parallel to them in reality; all lines such as cornices, string courses, plinths, window heads, and sills, on this and the other end of the house. Just in the same way AA′ and BB′ get nearer as they get more distant, and if continued will meet in their VP. in this case about 26 inches from the nearest corner of the building; along the HL., again, all lines parallel with these lines, such as cornices, &c., will also vanish at this point; it is the VP. for all lines at 30° with the picture plane, and the first VP. we spoke of is the VP. 60°.

Now draw diagonals from the opposite corners of the front and repeat the operation at the end, and draw vertical lines through the crossings. The front and end are divided by these vertical lines into equal perspective divisions; at the end, the line AD is cut at the perspective centre, each part being five parts in length (*i.e.*, 10 feet), mark ten divisions on the vertical line and you get apex of gable. Now draw the sloping sides; from D and A′ draw sympathetic lines crossing at D′, and from E draw sympathetic line to

E′. ADD′A′ is an outline plan of the four walls at roof level, and EE′ is the line exactly under ridge. Mark the apex of gable F and draw a sympathetic line through it; a vertical line from E′ cuts the ridge at F′. Join F′A′ to get distant slope of roof; now mark the centre of AA′ at G, and set up a gable the same width and height as gable at end, marking the slopes JH and JI. Through J draw a sympathetic line JK, cutting the long ridge; HK will then be the valley line. Again notice all these slope lines cut through the angles of squares on each plane; their vanishing points can be got by drawing lines through the corners of squares (2 in height and 1 wide). These lines would vanish at VPs. on vertical lines drawn through the 30° and 60° VPs. before described. The valley line HK vanishes in this case at a point about 11 inches about the HL., in a vertical line drawn through the DVP. (diagonal vanishing point), a point of the utmost importance, and yet very little used or even known. By drawing through the divisions on the front and side of the plane ADD′A′ to the DVP. on HL., all these perspective divisions will be accurately transferred to the back and other end line of the plane; the plan line of ridge EE′ is also perspectively divided. This process is very apt, and of the greatest utility, enabling one to solve several difficult problems in the easiest possible manner. As the result is very important, I will again state the case :—

Lines drawn through the ticks on each main plane to the DVP. will cut all receding planes and all projecting planes in similar perspective manner, and as one main plane is generally at right angles to the other, this means nearly every line on a plan.

By drawing sympathetic lines through C and B′, the remote angle of the plan of house is found. Besides the diagonals of a plane giving the centre of the plane, the cross diagonals of any cuboid form will give the centre of the mass, thus O is the centre of the form up to eaves line. The centre of the plan ADD′A′ can be found by drawing sympathetic line through G; or by cross diagonaling; the apex of hip is found, in vertical through tick of intersection of line from A to DVP., with plan of ridge.

SHORT DESCRIPTION OF PLATE 4, CHAPTER II.

PLATE 4, Chapter II. *Drawn over Diagram A, R.'s "Method," 6th Edition.*

Drawn to illustrate Vanishing of the Various Planes, the Distance to the Various Vanishing Points, and Introduction to the Diagonal Vanishing Point (DVP.), with some of its advantages in use.

III

VANISHING POINTS AND MEASURING POINTS — PROJECTIONS — PERSPECTIVE PLANS, DIVIDING BY DIAGONALS

I USE the words sympathetic lines to indicate lines converging to their vanishing points. The nearest angle on the diagrams is ticked at each quarter of an inch, and from these ticks lines are ruled each way to the vanishing points. Now, any lines you draw over these, or between them, going in the same direction, will be sympathetic. If we had the vanishing point, we should just stick a pin in, and with a straight-edge held to the pin should be able to rule in these sympathetic lines; but the VP. is generally too far away, so we rule or sketch in lines going sympathetically, and judge by our eyes that we have got the correct direction; a very little practice enables one to draw these quite satisfactorily, especially if one uses a long transparent celluloid set-square or straight-edge. In work, the required lines will often be on the side of the sketch where the lines run to the other vanishing point, but your set-square, reaching to the other side of sketch, will at once keep you right in drawing these lines; a slip of stout tracing paper folded, or better still a folded slip of tracing linen, makes a very good temporary straight-edge.

These sympathetic lines represent the top and bottom of the front and side of any square-angled object, and all other lines really parallel to them.

All lines through the angles of a square (2 in height and 1 in width) on either plane, if continued up or down, would go to the diagonal vanishing points in the vertical lines drawn through the VPs. of the front or side planes; these DVPs. are much too high or low to show on the diagrams; the 30° VP. is about 26 inches away from the nearest angle, and the DVPs. on this side are 30 inches above and 30 inches below this VP.; on the 60° side of the sketch the VP. is about $8\frac{3}{4}$ inches away from the nearest corner; and the DVPs. on this side are about $17\frac{1}{2}$ inches above and $17\frac{1}{2}$ inches below this vanishing point; we can, however, use them by drawing through the corners of the squares on either plane.

The DVP. for all horizontal planes is shown on the HL.; it is about 4 inches from the nearest corner on the 60°, 30° diagram. On the 75°, 15° diagram it is about $8\frac{3}{4}$ inches from the nearest corner; and on the 45°, 45° diagram it is on the nearest corner. To these points vanish the diagonals of all squares that can be drawn on plan, at any height: their uses in R.'s method are very numerous, and they prove most helpful in many different ways. These points are not generally used at all in the plan method, and they are only used in a very limited manner in the measuring point method; but when used in connection with the perspective divisions, on any pair of vanishing lines, the most complicated and irregular planning can be readily drawn to scale; and the correct drawing of octagons, circles, and other elementary figures becomes an easy matter on any perspective horizontal plane.

The long diagonal can also be very aptly used, and with the diagonal to DVP. in HL. will enable you to solve many problems even without the sympathetic lines; these two diagonals, used with the sympathetic lines, greatly facilitate work.

PLATE 5.—In Fig. 1 the main planes are at 75°, 15°; now the diagonals for these are at 60° and 30°. In Fig. 2 the main planes are at 60°, 30°; and the diagonals for these are at 75°, 15° (R.'s Method, 6th Edition). Diagrams C and A show these respective planes in elevation. It is interesting to notice how the diagonals of one plane become the main planes of the other, and *vice versâ*. Diagram B has the main planes at 45°, 45°, so one diagonal is horizontal, and the other at 90°; *i.e.*, the DVP. is on the nearest corner (see Fig. 3). These three figures show the way to set out the VPs. and the DVPs. by drawing lines through the eye (spectator) parallel to main planes of object; these lines cut the HL. in the VP. of these, and all other lines parallel to them. Thus, in Fig. 1, the main planes of the cube are *a*, *c*; through the eye, lines A and C are drawn parallel to these planes to the HL., which they cut at the VPs.; the VP. 15° is the VP. for the 15°-plane, and the VP. 75° is the VP. for the 75°-plane; the diagonal is marked *b*, and the DVP. is found by drawing through the eye a line B parallel to this to meet HL. at DVP. The other diagonal VP. is not required, and if so, it would be at a long inconvenient distance away. The measuring point of VP. 15° is got by putting leg of compass in the VP., taking the distance to eye, and marking this on the HL. at MP.; the measuring point of VP. 75° is got by putting leg of compass in the VP., taking the distance to eye, and marking this on the HL. at MP.; and the same working will give the corresponding points on Figs. 2 and 3.

As triangles come so constantly into use in the constructional lines of perspective diagrams, it is well to know some of the properties of their sides and angles. In Fig. 4 the triangle is drawn on the diameter of a semicircle, and as the angle touches the circumference it is a right angle. (The angle on a quarter of circumference is 45°.) I have drawn this triangle with sides in the proportion 3, 4, 5; when the square of one side is equal to the squares on the other two the angle must be a right angle: $5^2 = 25^2$, $3^2 = 9$, and $4^2 = 16$, $9 + 16 = 25$.

In Fig. 5 we have a right-angled triangle, with a perpendicular drawn from apex of right angle to opposite side.

Now, from above we have $C^2 = A^2 + B^2$, $A^2 = D^2 + E^2$, and $B^2 = D^2 + F^2$. I have taken the sides in the same proportion as before. Now,

$$F = \frac{B^2}{C} = \frac{16}{5} = 3 \cdot 2.$$

$$\text{Again, } E = \frac{A^2}{C} = \frac{9}{5} = 1 \cdot 8.$$

$$\text{Again, } D = \sqrt{(E \times F)} = \sqrt{5 \cdot 76} = 2 \cdot 4.$$

$$\text{Again, } D = \frac{B \times A}{C} = \frac{4 \times 3}{5} = \frac{12}{5} = 2 \cdot 4.$$

Again, the side E is the tangent of the angle *a*, and A is the secant, D being the radius, so any trigonometrical tables will give you the lengths of E and A. E is also the cotangent of angle *b*.

I record the above useful data for reference, not necessarily to be learned.

Plate 6 gives an irregular plan drawn in by lines ruled through the division ticks on lines of main plane to the DVP. Such a plan is more clear when drawn at a distance from the HL.; you can draw it high up so that it will not interfere with the elevation. I have kept to simple measurements to more clearly show the principle of the method. Starting from the corner, tick off two divisions, then through this tick draw a sympathetic line outwards, then go along main plane four more divisions and draw another sympathetic line outwards; now starting with the second tick, draw lines through it and the next six ticks to the DVP.; bring them well forward, join the points 2′, 2′, this will be the front line of a bay window, projecting two parts, and being four parts wide; cut off the cants by joining the first tick from each corner; now draw a sympathetic line inwards through the eighth tick on main plane, this is already perspectively divided by the lines already drawn; now draw several more lines from the ticks on main plane to DVP., and continue the process in a similar manner; also tick off the plan on the other plane, showing the square bay. Vertical lines from the plan continued down will give the corners of the elevation; the base line is taken two spaces below the HL. and the eaves line eleven spaces above. Starting from the nearest corner sympathetic lines can be continued all round the building.

Plate 7 shows the three methods of getting projecting planes and mitres. Fig. 1 shows a square block, eight divisions on front, and eight divisions on side. It is required to put a large overhanging slab projecting six parts over each face; first draw the top lines 00, 00; produce them, and draw sympathetic lines outwards through the distant corners 0, 0; then draw lines from the first, second, and third ticks from the corners (representing 2, 4, 6 divisions) to the DVP.; these lines will cut the others at 2′, 4′, and 6′; join these points and you have the required overhang on the near sides; draw the long diagonal through 0, 0, and from points where it cuts the overhang draw sympathetic lines, which will complete the figure. Figs. 2 and 3 show the same result with diagonals drawn through the vertical squares, Fig. 2 being got by diagonals through the spaces, Fig. 3 by diagonals through the squares.

PLATE 8, Fig. 1.—A form forty parts long, thirty parts wide, and fifteen parts high, has the front and side first divided into two parts in width and height by diagonals; then each width is again divided by one diagonal only cutting the horizontal division; then the whole mass is centred at C by diagonals from the extreme opposite points. Fig. 2 shows a plan of the form bisected in length and width by diagonals at the point C, which is vertically over the C in Fig. 1. The widths are again divided by one diagonal, and the nearer parts again divided in length and width by cross diagonals.

Plate 5.

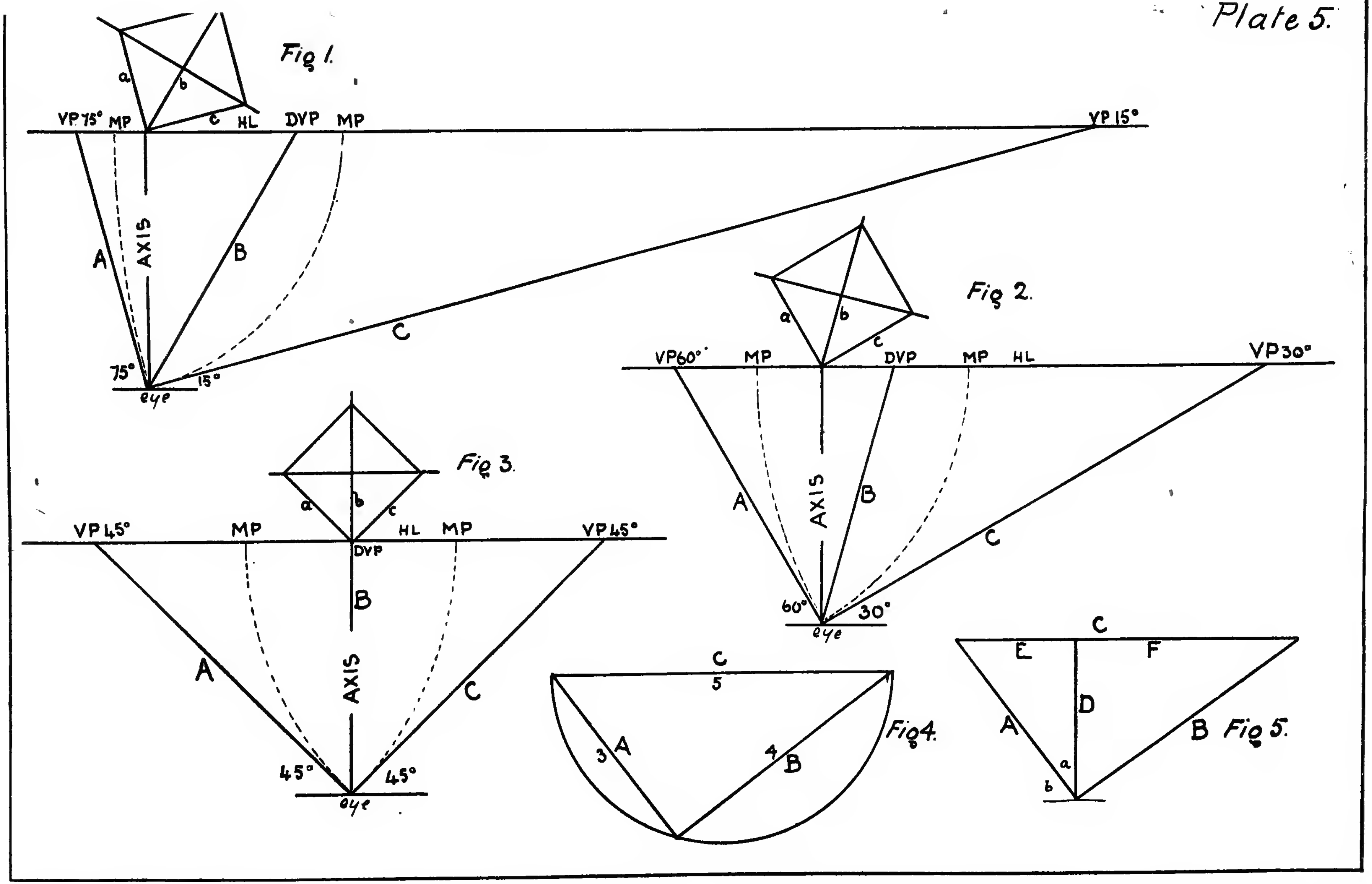


Fig 1.
VP 75°
MP
HL
DVP
MP
VP 15°
a
b
c
A
AXIS
B
C
75°
15°
eye
Fig 2.
VP 60°
MP
DVP
MP
HL
VP 30°
a
b
c
A
AXIS
B
C
60°
30°
eye
Fig 3.
VP 45°
MP
HL
MP
VP 45°
DVP
a
b
c
A
B
AXIS
C
45°
45°
eye
Fig 4.
C
5
3
A
4
B
Fig 5.
C
E
F
D
A
B
a
b

Plate 6.

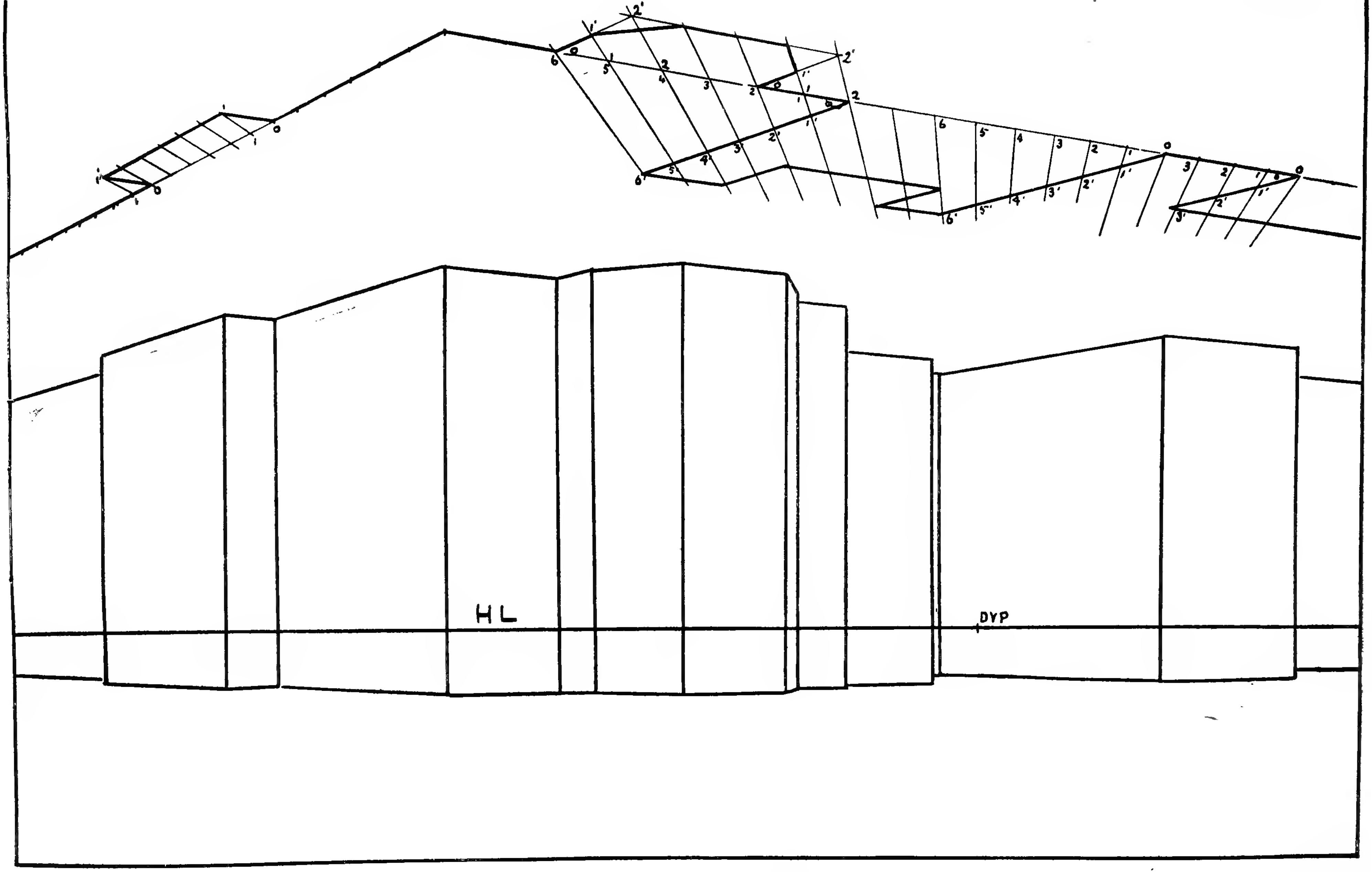


Plate 7.

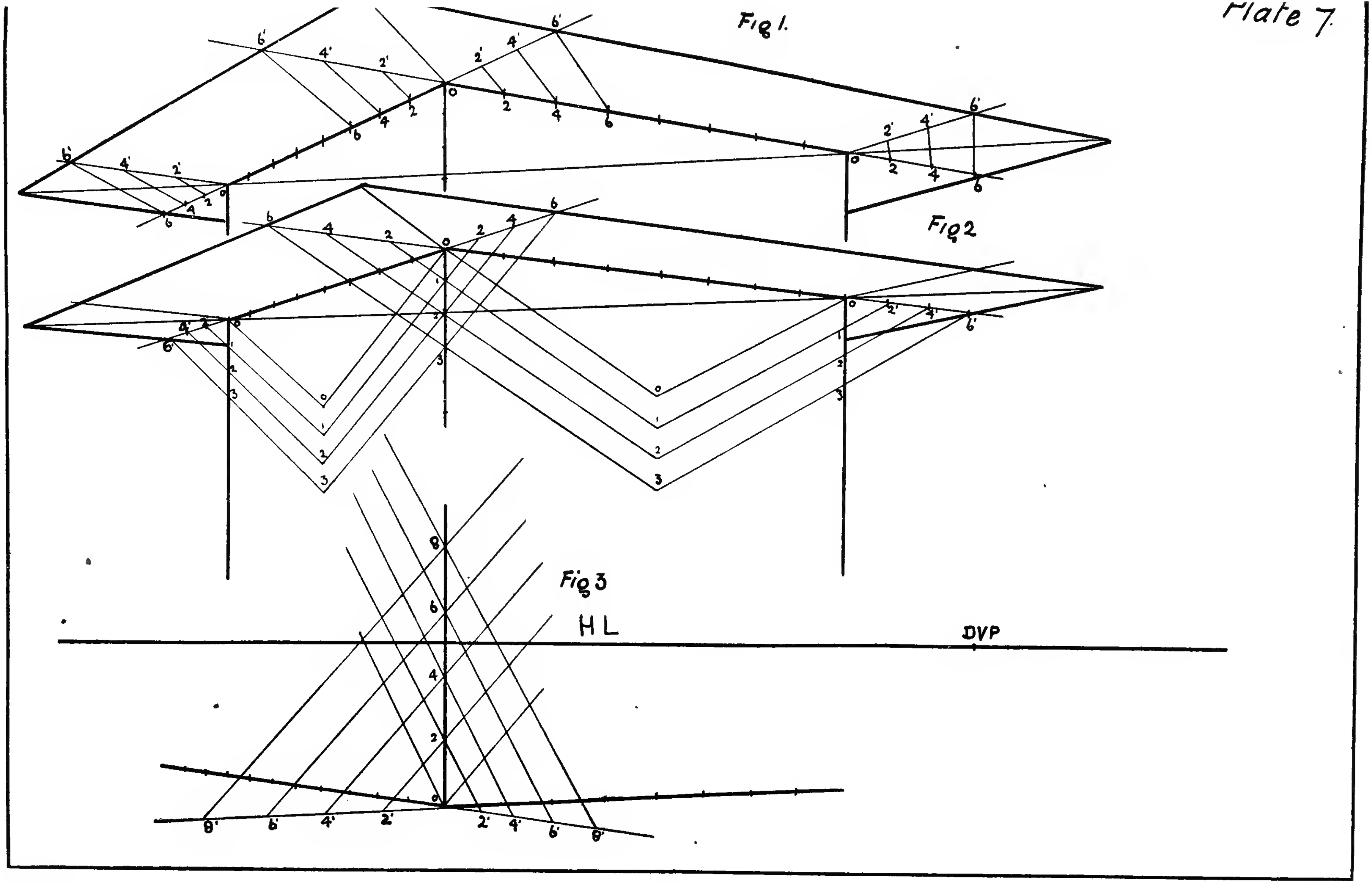
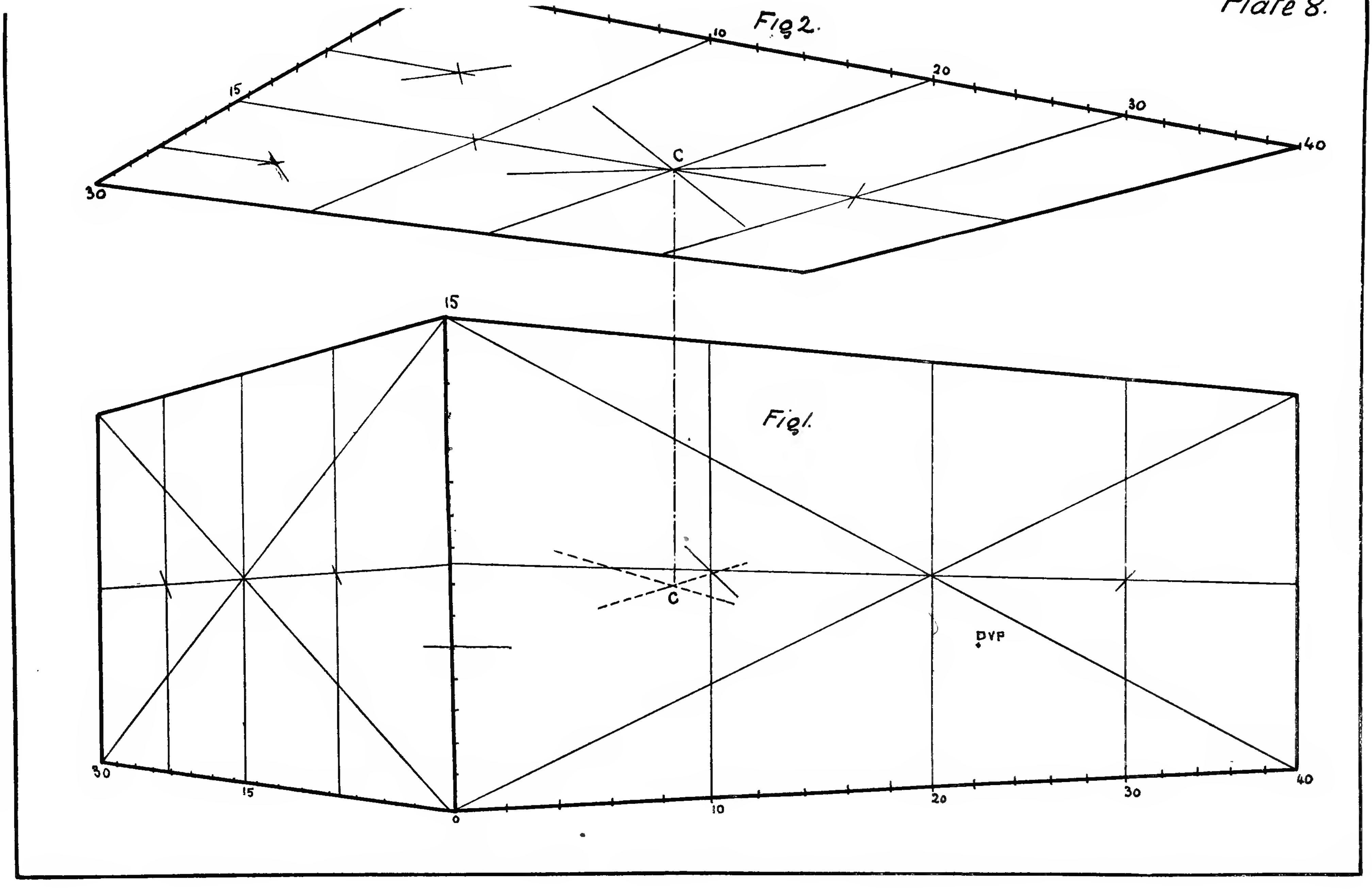


Plate 8.



IV

LINES AT ANY ANGLE OR INCLINATION—SCALES

PLATE 9.—You will be able to draw lines at any angle or inclination near enough for all practical purposes of drawing by learning the simple key shown on Fig. 1, which is formed over a square with sides of ten equal parts. Learn the following series of figures, 6, 6, 5, 5, 5, 4, 4, 4, 3, 3; then from one corner draw a line through the first division on opposite side; this line makes an angle of 6° with bottom line.

A line to next division gives	12°.
,, ,, ,,	17°.
,, ,, ,,	22°.
,, ,, ,,	27°.
,, ,, ,,	31°.
,, ,, ,,	35°.
,, ,, ,,	39°.
,, ,, ,,	42°.
,, ,, ,,	45°.

This last line goes through the corners of the small squares; then travelling round the top line we reverse the series of figures, 3, 3, 4, 4, 4, 5, 5, 5, 6, 6,

and get a line through the next division giving	48°.
,, ,, ,, ,,	51°.
,, ,, ,, ,,	55°.
,, ,, ,, ,,	59°.
,, ,, ,, ,,	63°.
,, ,, ,, ,,	68°.
,, ,, ,, ,,	73°.
,, ,, ,, ,,	78°.
,, ,, ,, ,,	84°.
,, ,, ,, ,,	90°.

These whole numbers are very near to the mathematical truth, and in this form are easy to remember and of great assistance in practical work.

I have taken tangent of	6° as	·1.	Trigonometrical tables give		·1051042.
,, ,,	12° ,,	·2.	,,	,,	·2125566.
,, ,,	17° ,,	·3.	,,	,,	·3057307.
,, ,,	22° ,,	·4.	,,	,,	·4040262.
,, ,,	27° ,,	·5.	,,	,,	·5095254.
,, ,,	31° ,,	·6.	,,	,,	·6008606.
,, ,,	35° ,,	·7.	,,	,,	·7002075.
,, ,,	39° ,,	·8.	,,	,,	·8097840.
,, ,,	42° ,,	·9.	,,	,,	·9004040.
,, ,,	45° ,,	1·0.	,,	,,	1·0.

Analysing this scale you will see that a diagonal through squares gives 45°; and as this is the usual inclination for tiled roofs, we may get our inclinations for such roofs by drawing the slope lines through the angles of squares (2 in height and 1 in width).

A diagonal through	5 squares	gives an angle of		12°,
,, ,,	$2\frac{1}{2}$	,,	,,	22°,
,, ,,	2	,,	,,	27°,
,, ,,	$1\frac{1}{4}$	,,	,,	39°,

and so on. For any special purposes, by means of this scale the inclination and direction of lines at any required angle can be readily learned, and any intermediate angles can be set out by dividing 0 to 6 into six parts, 6 to 12 into six parts, the next three divisions into five parts each, the next three divisions into four parts each, and the next two divisions into three parts each. I have shown this by small figures on the plate, as it gives a simple way of remembering the angles.

What can be done on geometrical squared paper can also be done on the perspective squared paper of R.'s diagram.

We can, then, draw any of the inclinations over the diagrams, and by continuing any one of these lines drawn in perspective to the vertical line drawn through the VP. of the plane you will get the VP. of that line and all lines parallel to it; we can use the diagonals for direction, and get all the advantage of these distant vanishing points without finding them, as will be shown later on Plate 10.

This Fig. 1 should be well studied, as it gives great facility in drawing.

Fig. 2 shows a near way of setting out the angles 60°, 30°, by taking a diagonal to 6 squares by $3\frac{1}{2}$ squares, giving a right-angled triangle which is half of an equilateral triangle.

Fig. 3 shows a diagonal to 11 squares one way and 3 squares the other; this quickly gives the angles 15°, 75°.

By means of these two figures you can readily set out on ordinary squared paper the working lines of perspective diagrams. Squared paper is far more useful than is generally thought. I know no more practically useful note-book than a penny exercise book, ruled in squares. I have used them for years, and always have a pocket made sufficiently large to carry them.

Plate 10.—The lines A, A, A, A are drawn at inclinations of 39° with the horizon by simply drawing diagonals through $1\frac{1}{4}$ square (*i.e.*, a figure 4 squares by 5 squares).

The lines B, B, B, B are drawn at inclinations of 27° with the horizon by drawing diagonals through 2 squares (*i.e.*, a figure 2 squares by 1 square).

The lines C, C, C, C are drawn at inclinations of 22° with the horizon by drawing diagonals through $2\frac{1}{2}$ squares (*i.e.*, a figure 5 squares by 2 squares).

The lines D, D, D, D are drawn at inclinations of 12° with the horizon by drawing the diagonal through 5 squares (*i.e.*, a figure 5 squares by 1 square).

Horizontal angles can be got in the same way by diagonals.

Plate 11.—The divisions given on the perspective diagrams can be further subdivided decimally as shown in Fig. 1, or into inches as shown in Figs. 2 and 3. It is important to remember that the inches or decimals must always be ticked off at the end, not the beginning, of the measurement, for, being a diminishing scale, to take the inches at the start would lead to error.

In reading off complicated measurements from a plan, it is much easier to take every dimension from a starting corner; for instance, suppose one reads 3 feet 1 inch, 4 feet $2\frac{1}{2}$ inches, 1 foot $10\frac{1}{2}$ inches, 4 feet $2\frac{1}{2}$ inches; to plot such in perspective would require care, but if each dimension is scaled from the corner and read 3 feet 1 inch, 7 feet $3\frac{1}{2}$ inches, 9 feet 2 inches, 13 feet $4\frac{1}{2}$ inches, it saves a lot of complication, and quickly gives accurate results. It is better to tick the horizontal dimensions at their proper level, the ground floor at about half height of the windows, and the higher floors in the same way. It is an excellent way to make a perspective plan of the roof, showing the ridges, hips, valleys, and chimney, to show where these can then be drawn in their true positions on the perspective drawing without complication. A roof plan drawn high up, and a ground plan drawn low down, will very much help the making of a perspective drawing.

A very quick way to get all the widths from a geometrical drawing to the perspective diagram is to take a slip of drawing paper, on which tick a scale of feet to same scale as geometrical drawing; mark the fourth divisions thicker; this scale can now be applied to the geometrical drawing, and the details ticked on to scale; similar placed ticks made over the perspective diagrams will complete the operation and transfer the geometrical measurements into perspective without reading them off. This very much facilitates work, as plans of any scale can be dealt with; it is, however, not so advisable for students, as they miss the advantage of handling the scales.

Fig. 4 is a very useful perspective scale. The vertical line is divided into ten equal parts; 0, 11 into eleven perspective parts; 0, 12 into twelve perspective parts, and so on to 0, 26, which is divided into twenty-six perspective parts. The sloping line forms the hypothenuse of a right-angled triangle, which is by this means divided perspectively into the same number of parts as there are parts on the sides containing the right angle. There are other very interesting properties shown in this diagram worth looking into. Fig. 5 shows diagonals of perspective squares; these are better shown on a later plate.

Plate 9.

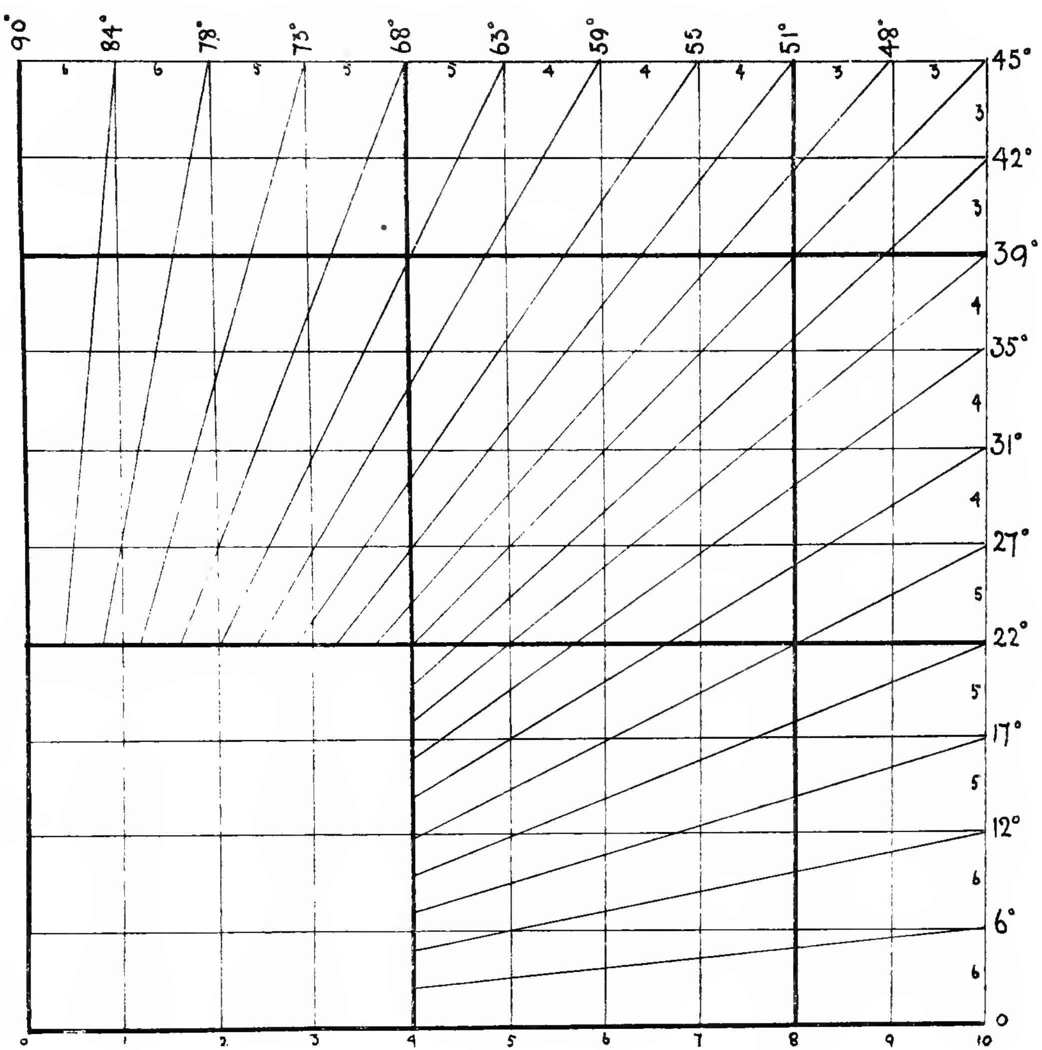


Fig 1.

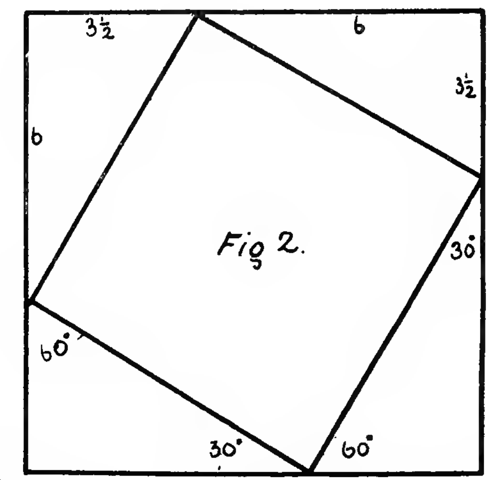


Fig 2.

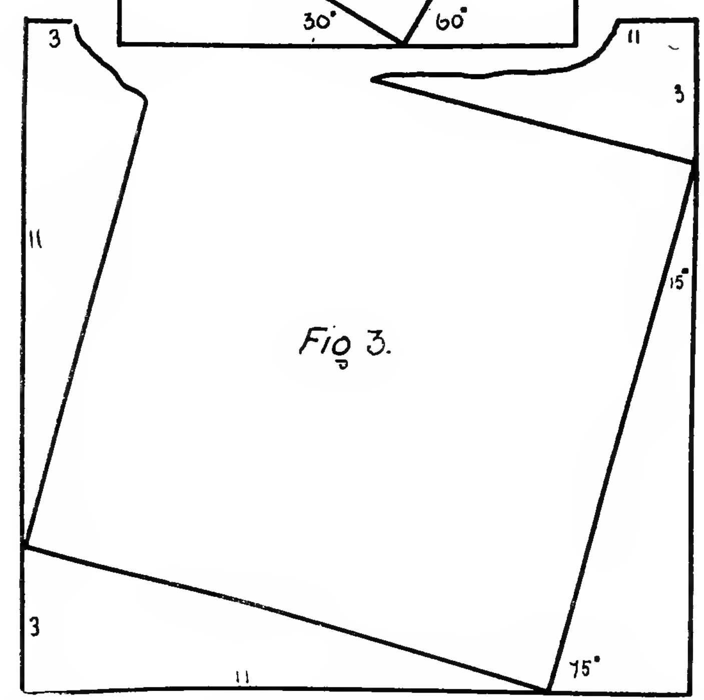


Fig 3.

Plate 10.

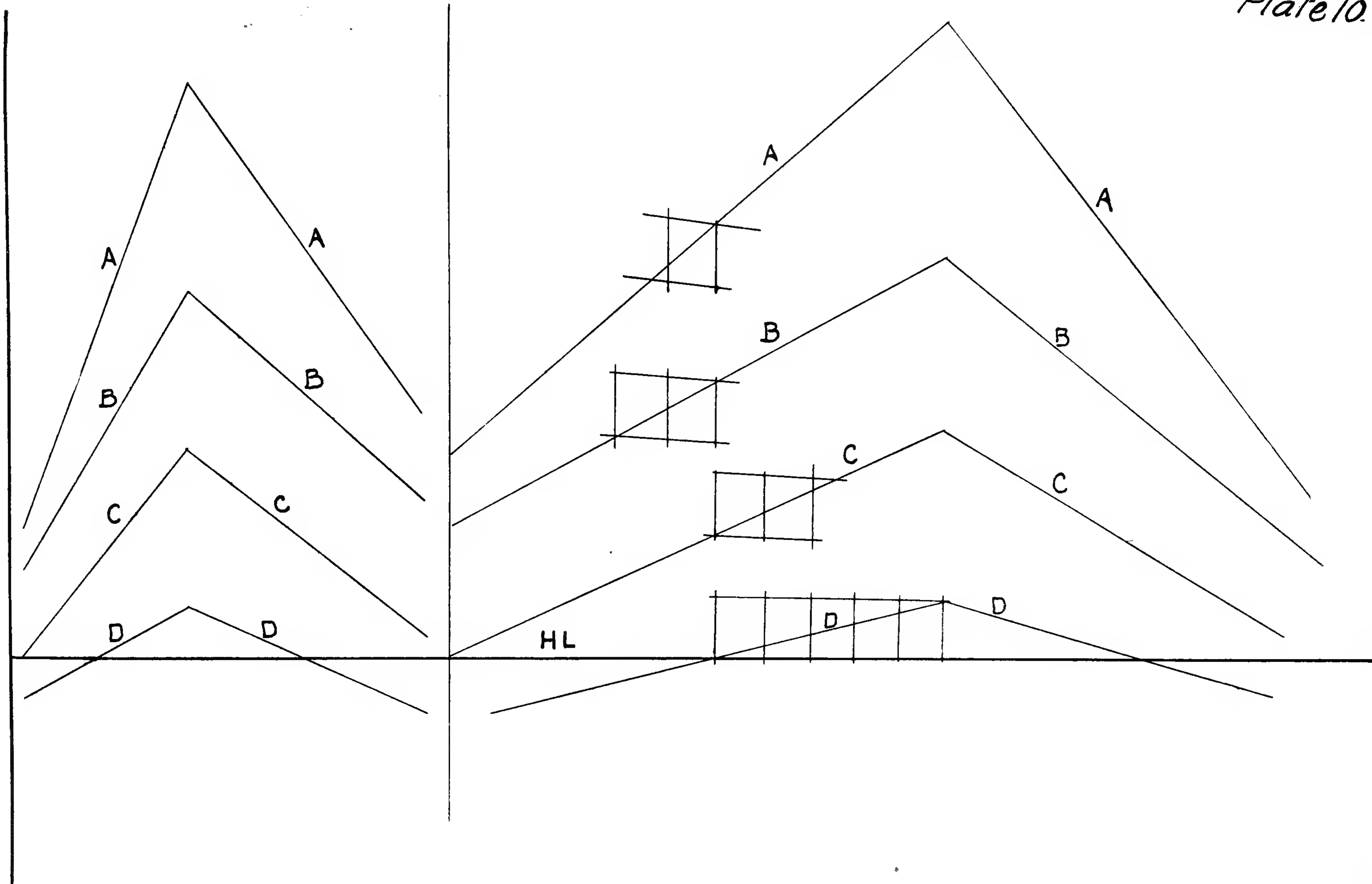
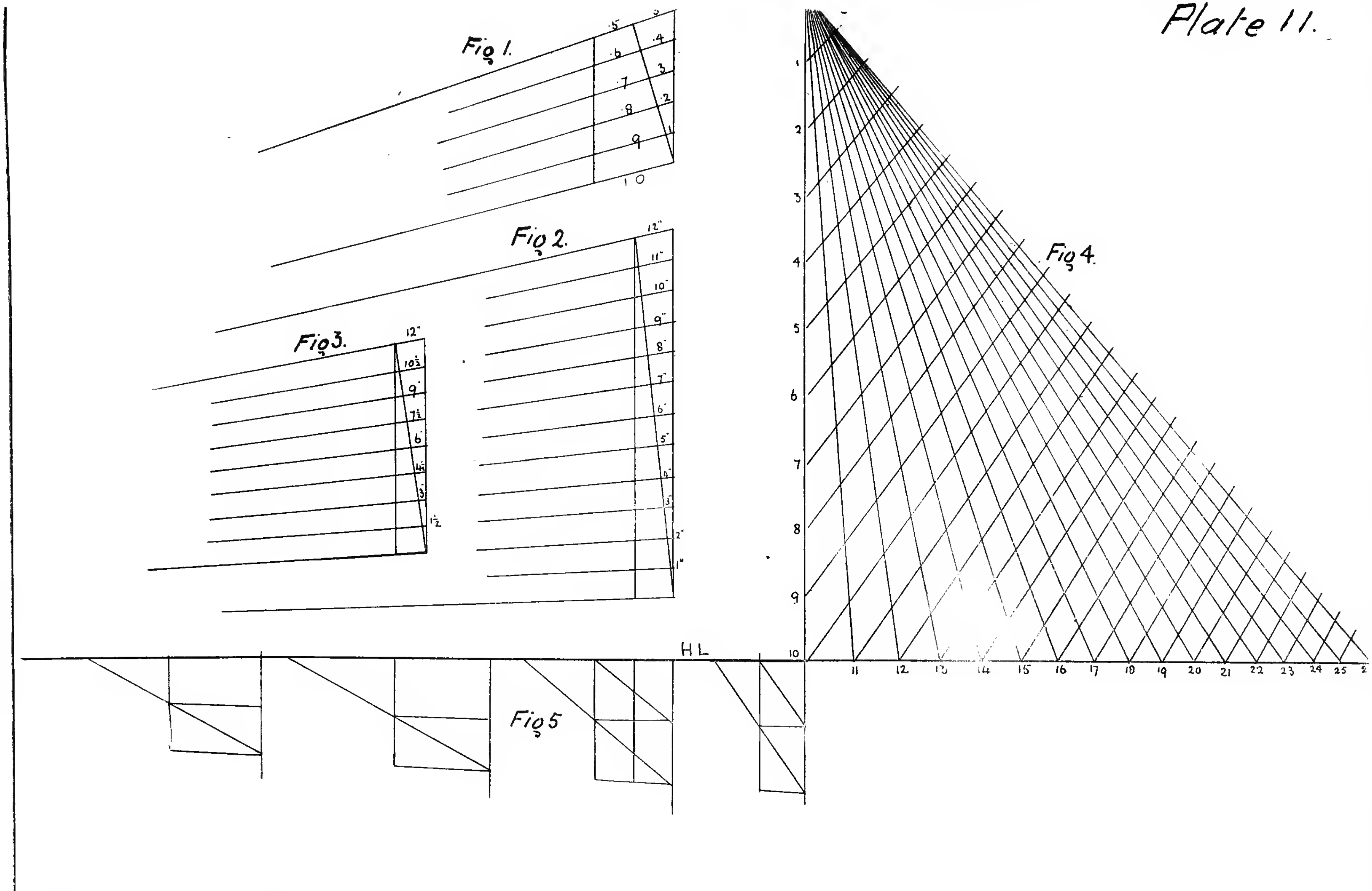


Plate II.



V

SQUARES—OCTAGONS AND TICKS FOR CIRCLES

PLATE 12.—The square, octagon, and circle follow from each other very naturally, and are the foundations of nearly all design in architecture and furniture. Now a square with its four equal sides and four right angles is most easily drawn by means of a T square and 45° set-square; but you will learn very much more about it by drawing it on squared paper by hand. Fig. 1: draw a square with 24 parts or divisions on its sides over diagram F, which consists of squared paper, with each alternate upright line left out so as to correspond with the perspective diagrams, each space being $\frac{1}{4}$ inch high and $\frac{1}{2}$ inch wide; so that the square we have drawn is divided into 24 upright divisions and 12 horizontal divisions. Now draw one diagonal by hand, noticing that it passes through the angles of the small squares (2 in height and 1 in width). This diagonal has a certain proportion to the sides, for the square of it equals the square of the two sides. Now the square of 24 is 576, the square of the two sides = 1152, so the diagonal equals $\sqrt{1152} = 33{\cdot}9$: for all practical purposes 34; so the side is to diagonal

as 24 to 34,
or 12 to 17.

This is usually given in books on practical geometry, but I give you another which is very near and particularly useful,

as 7 to 10.

I select these figures, because they come so well in ticking off a square into an octagon:

7, 10, 7,

adding up to 24, say the 24 divisions on our 2-foot rules; or again, $3\frac{1}{2}$, 5, $3\frac{1}{2}$, adding up to 12, say the 12 divisions of our 12-inch scales.

Tick off the sides of the large square into 7, 10, 7 divisions, and carefully draw the canted sides through the angles of the small squares. This will give you a large octagon. Draw the other diagonal and tick the centre of each side of the square; these four points and the points where diagonals cut the canted sides will make eight ticks, through which we can draw a circle, which would be inscribed in the square.

The square, octagon, and eight ticks for circle can be found by the same means over the perspective diagrams.

7, 10, 7 are not true mathematical proportions, but quite near enough

6

for all practical purposes of drawing. 7, 9·9 7, or 7·07. 10, 7·07 are nearer the mathematical truth.

Fig. 2 shows how to divide a line AB in the proportion 7, 10, 7. On AB draw an equilateral triangle, produce the sides OA, OB, making *o*A continued equal 24. From this point draw a line parallel to AB to cut the other line produced; this new base line will be 24 in length, the points can be ticked to divide it into 7, 10, 7, and lines from these ticks to apex will divide AB into the required proportions.

Fig. 3 shows a useful scale, on which I have shown other divisions of a line into ticks for octagons; but I shall later on show how the divisions 7, 10, 7 can be universally used for any length of line.

The dotted lines at bottom of Fig. 1 show the proportions of one-eighth part of an octagon, with the arc on same. This will be found useful for many practical purposes.

Plate 13.—Over diagram A draw a large octagon in perspective, first drawing in the square of 24 parts, dividing these by ticks at divisions, showing the proportions 7, 10, 7; join the opposite corners of the square; draw the vertical through centre of sides, and a sympathetic line through centre of upright. You have now got the square, the octagon, and the eight ticks, one at centre of each side of octagon, through which a circle inscribed in the square will pass.

By drawing lines from each angle of the octagon to the centre, you get lines limiting the length of all lines for octagons concentric with the large one; and by drawing vertical and sympathetic lines at the same perspective distance from centre, and then joining these with inclined lines, you get octagons within the large one.

The proportions 7, 10, 7 can be further analysed:

thus, 7, $5 + 5$, 7;

again, $6 + 1$, $6 - 1$, $6 - 1$, $6 + 1$.

This gives easy rule for any length of line.

Bisect the line, bisect the parts, then take one-sixth from centre parts, and add to outer parts.

Figs. 2 and 3.—The above rule allows these octagons to be drawn in perspective at sight. In Fig. 2 notice the varying width of A, A, B, B; this is often missed in drawings of arches in perspective.

Plate 14.—Octagons on plan are drawn in the same manner; a square is first ticked in the proportion 7, 10, 7, from these points draw to the DVP. in horizontal line, and join the points to form octagon; then tick the centres of the sides, and draw diagonals of square which perspectively bisect the canted sides of octagon; you will now have the eight points through which the circle inscribed in the square can be drawn.

These octagons are drawn over diagram A, placed upside down.

Plate 12.

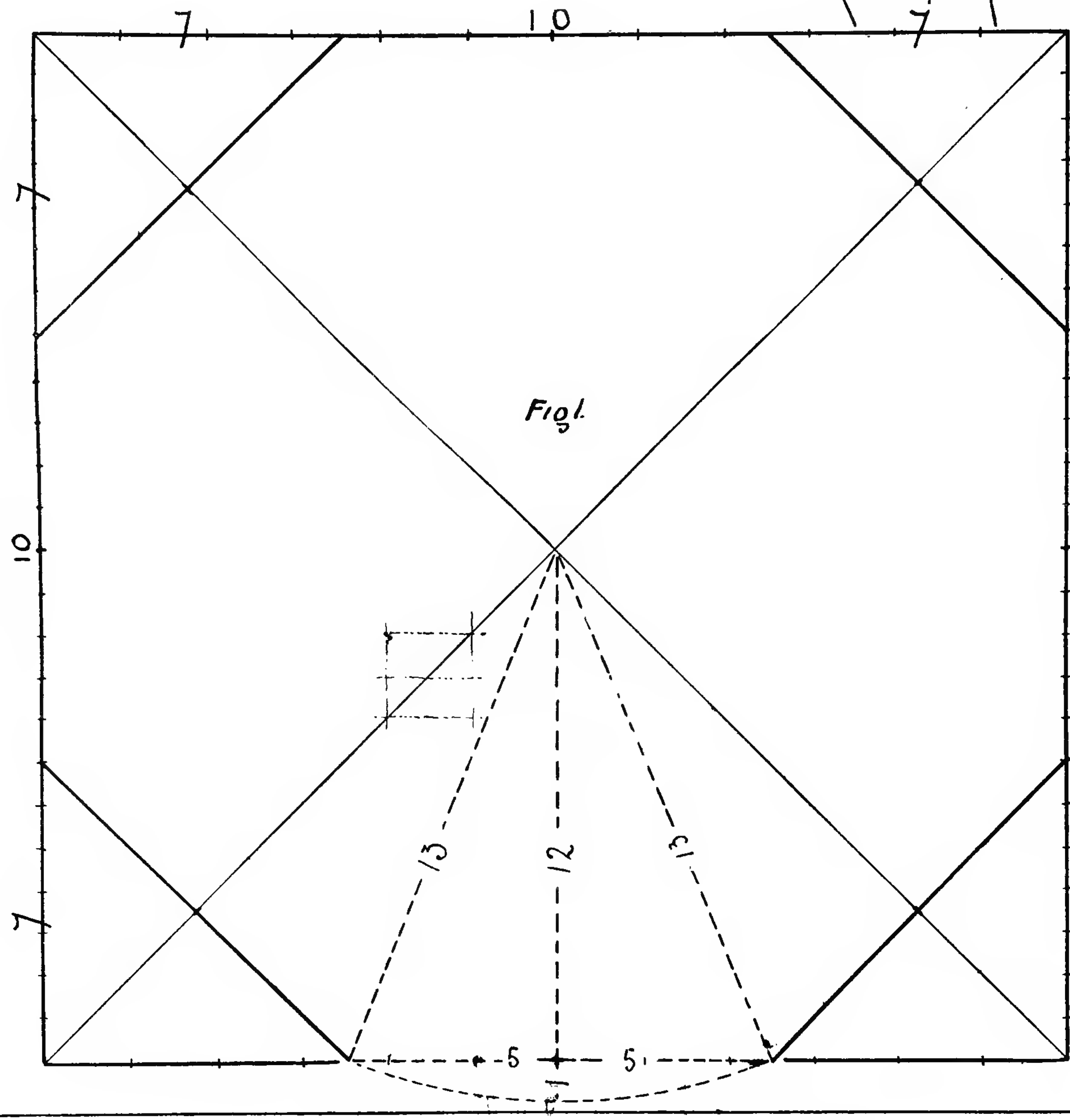


Fig 1.

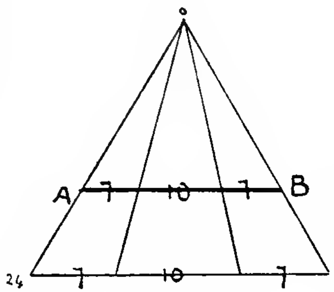


Fig 2.

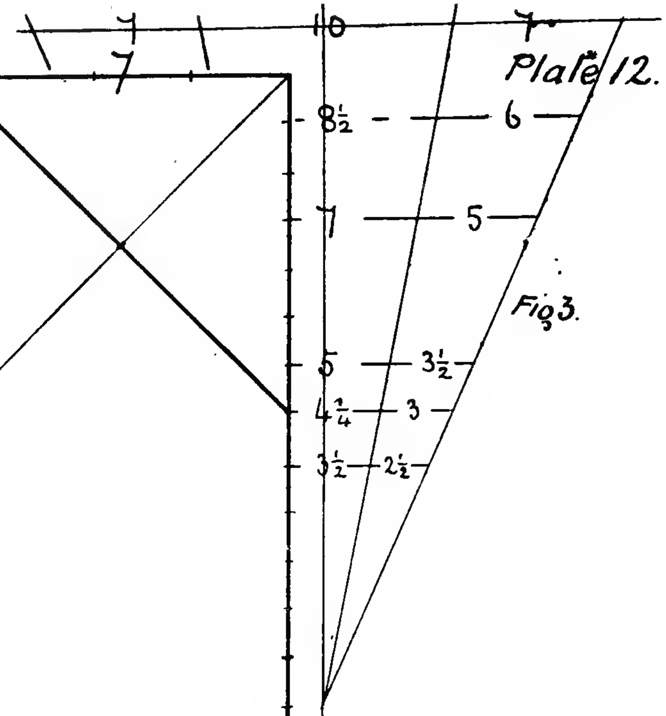


Fig 3.

7 — 9.9 — 7

or

7.07 — 10 — 7.07

12 — 17 — 12

Plate 13.

Fig 1.

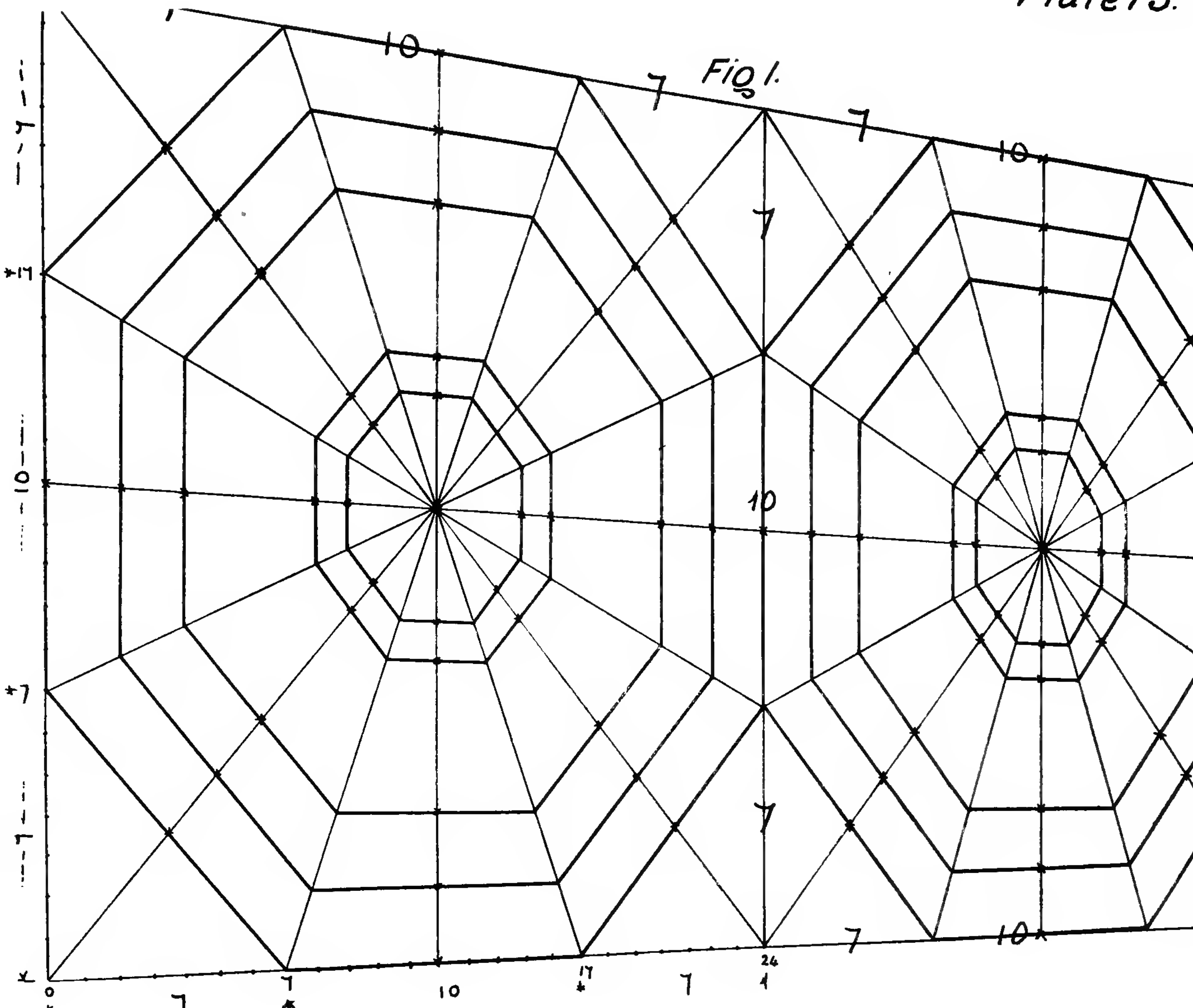


Fig 2.

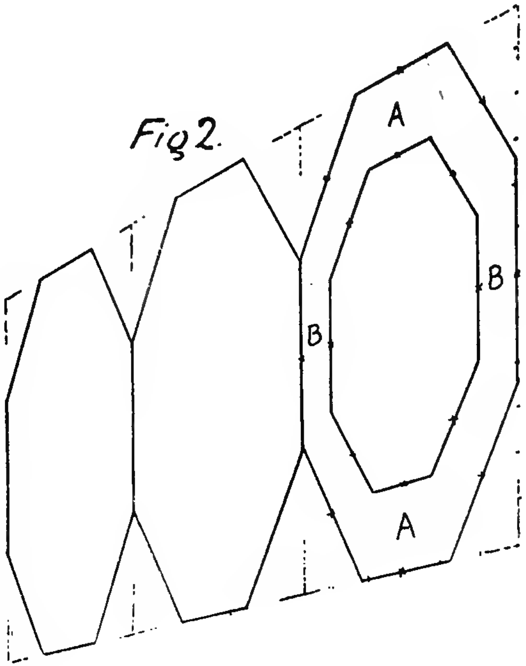


Fig 3.

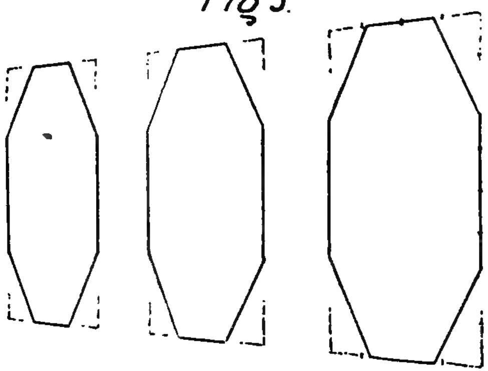
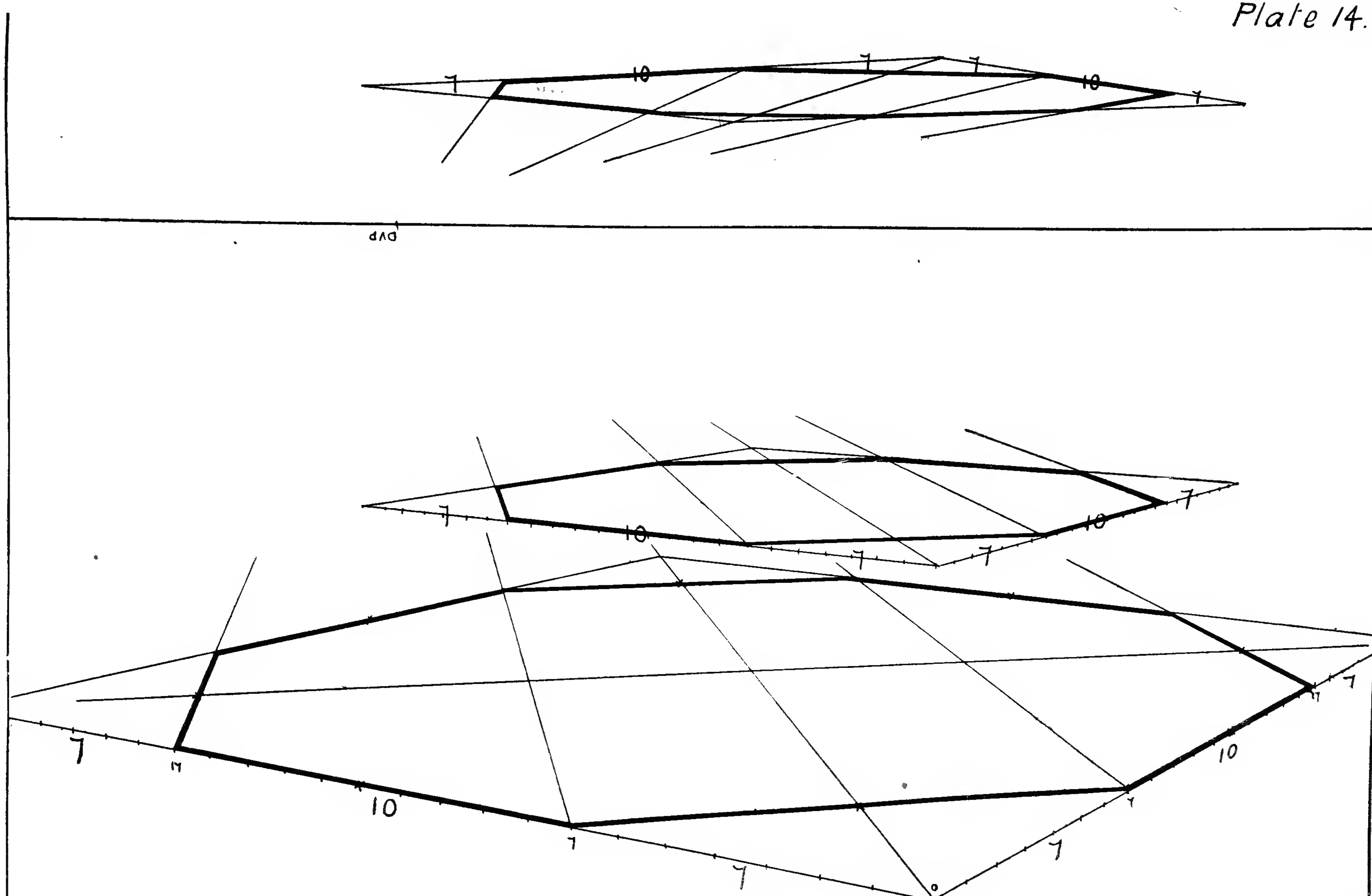


Plate 14.



VI

CIRCLES, SUBTLE CURVES, TRIANGLES, HEXAGONS, &c.

PLATE 15.—One of the most simple drawing operations we perform is to describe a circle, simply putting one end of the compasses to the paper, and revolving the pencil point round the centre; the ease with which this can be done geometrically, causing very little thought, will perhaps account for our difficulties in trying to draw a circle by hand, either geometrically or perspectively.

By means of Fig. 1 I will show how a circle can be drawn by hand over squared paper without the compasses. I shall then analyse its form, so that we can sketch it, or any part of it, with facility; you will also be able to draw it in perspective over the diagrams in any position on the picture. Its properties are very interesting; not only those so well explained by Euclid from his mathematical standpoint, but the artistic properties that correct drawing will make you much more familiar with.

Now, over diagram F draw a square with sides of 16 parts; tick the centre of each side; then tick the centre of each half side, and from these eight points draw a short line at right angles inwards, and tick these short lines 1 part long. Now these eight points (the inner ends of short lines) and the centre of each side will make twelve points, through which the required circle will pass; now draw a circle through these twelve points.

We will analyse one quarter of this curve. Starting from the bottom point it goes 2 parts (one space), and rises about $\frac{1}{4}$; it then goes 2 parts, and rises about $\frac{3}{4}$; so in 4 parts it has risen 1; if we take the same part of the curve, on the other side of the starting point we get a curve which rises in same manner. Now start again at the centre of other sides of the square, and note similar form. There remains but a small portion of the curve to analyse, and that seems very much like a diagonal slightly curved, going along three spaces and rising three spaces. This should be repeatedly worked on squared paper until you are quite familiar with the doing of it, for you will then be able to draw circles geometrically or in perspective at sight with a certainty of their being right, and you will be training your eye to the appreciation of correct form.

Fig. 2 shows a large circle to more particularly show the $\frac{1}{4}$-rise in the first 2 parts and the $\frac{3}{4}$-rise in the next 2 parts. Fig. 3 shows the crosses through which a circle cuts on half the original side, drawn to an enlarged scale. Fig. 4 shows a circle drawn by compasses through the ticks found by method description, which you see are quite near enough for all practical purposes of drawing.

PLATE 16.—Put drawing paper over diagram B, start at the top of nearest angle, and divide the paper on each plane into squares of 16 parts each. In height you can get one square and half, which brings you to the bottom space but one on the diagram; on the long side of paper mark ticks for circle, or parts of circles, in each square, and in the nearest square put the ticks for another circle, having the same centre, but the diameter only half as long. Now, on the short side of the paper without any ticks draw those portions of the circle we first analysed.

PLATE 17.—As you begin to draw circles all over your sheets you will notice that in some positions the axis of the ellipse (a circle in perspective becomes an ellipse) will incline, and the top end of the axis is not the highest point of the curve, as shown in Fig. 1. Again, in concentric circles, the axis of the outer one is nearer to the nearest angle than the axis of the inner one, and the centre of the square enclosing the circle is still farther away.

Figs. 3, 4, 5, 6, 7, and 8 are illustrations of circles, or rather parts of circles, drawn at sight by method already described.

PLATE 18.—It is easier to draw large circles on the horizontal planes through the ticks on the centre of the sides of the octagon, as already explained; yet over diagram E for parallel perspective they can be drawn by the method used for circles on vertical planes.

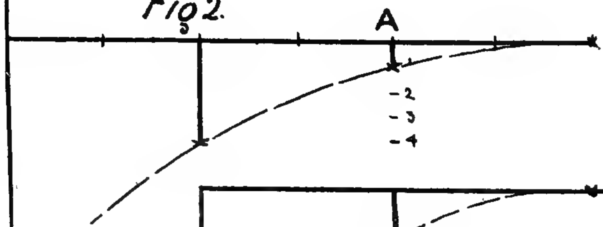
PLATE 19.—On one side of this plate subtle curvature is drawn over the diagram F; these are transferred by corresponding ticks into perspective over diagram A. In Fig. 4 the curve is not drawn, the ticks being marked to show more clearly the process. I sometimes use a geometrically ruled diagram on the most transparent paper I can get. This I place over any required curved work, and corresponding ticks are made on to the drawing. Gothic arches, elliptic and semi-elliptic forms, and all subtle curvatures are most easily drawn by this method, and I strongly advise that such forms shall first be drawn on squared paper, then analysed, for when so dealt with, the correct drawing of them is an easy matter.

PLATE 20.—The twelve points you have been using for the construction of the circle will also give you the points for an equilateral triangle, hexagon, and duodecagon.

In Fig. 1 I have drawn an equilateral triangle in a circle; the side may be taken as 14 and the height as 12 parts; the apex of the inverted triangle is 4 parts below base. With this data I have drawn equilateral triangles in perspective at sight. Fig. 2 shows hexagons, standing on flat side and on angle. A different but similar analysis of the equilateral triangle, again, enabled me to put hexagons in perspective at sight.

Plate 15.

Fig 2.



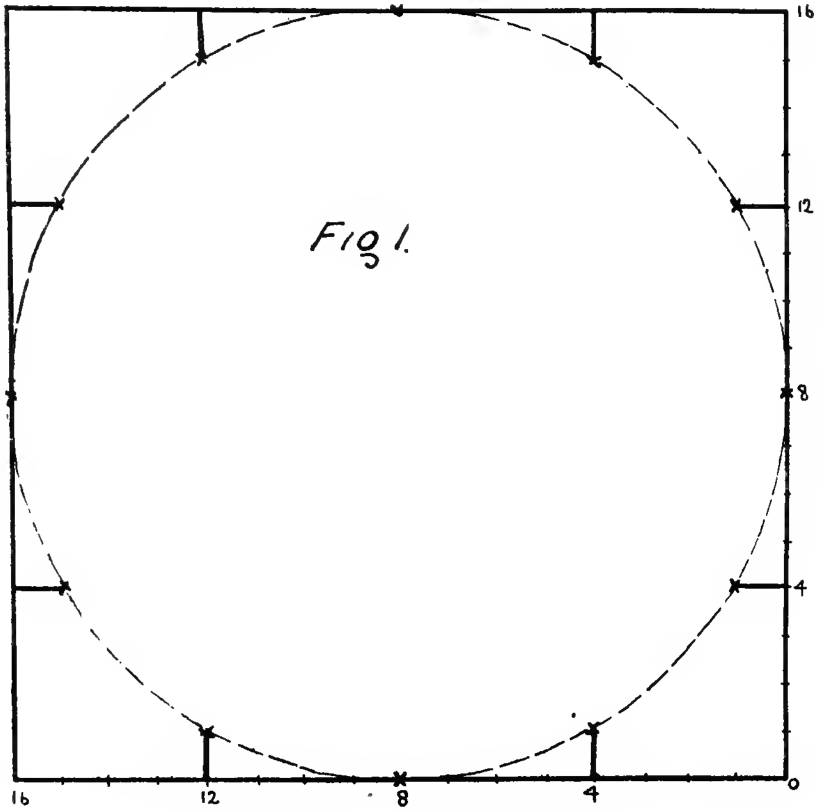


Fig 1.

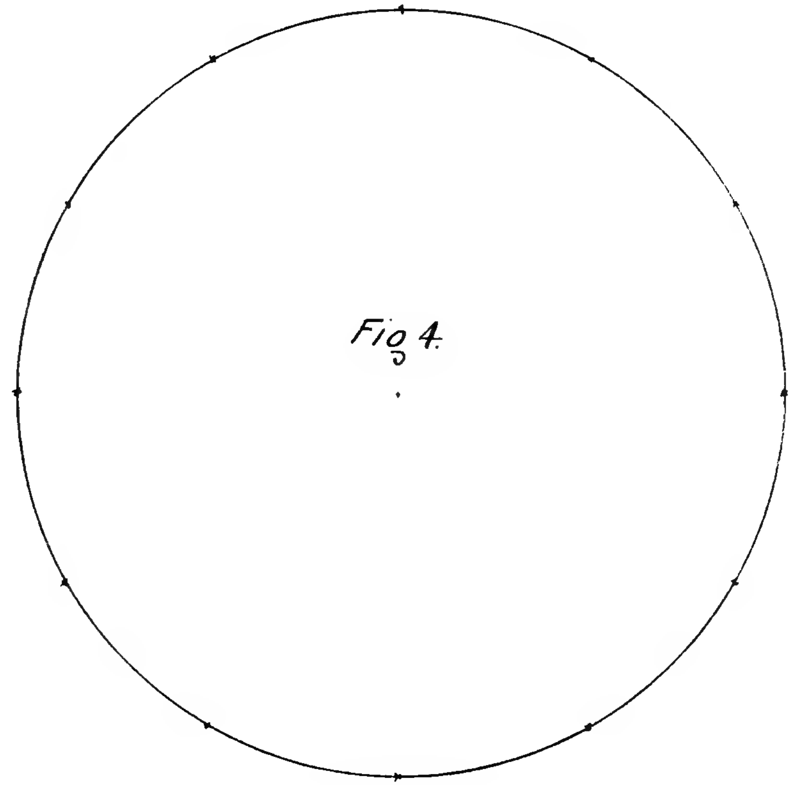


Fig 4.

Fig 3.

Plate 16.

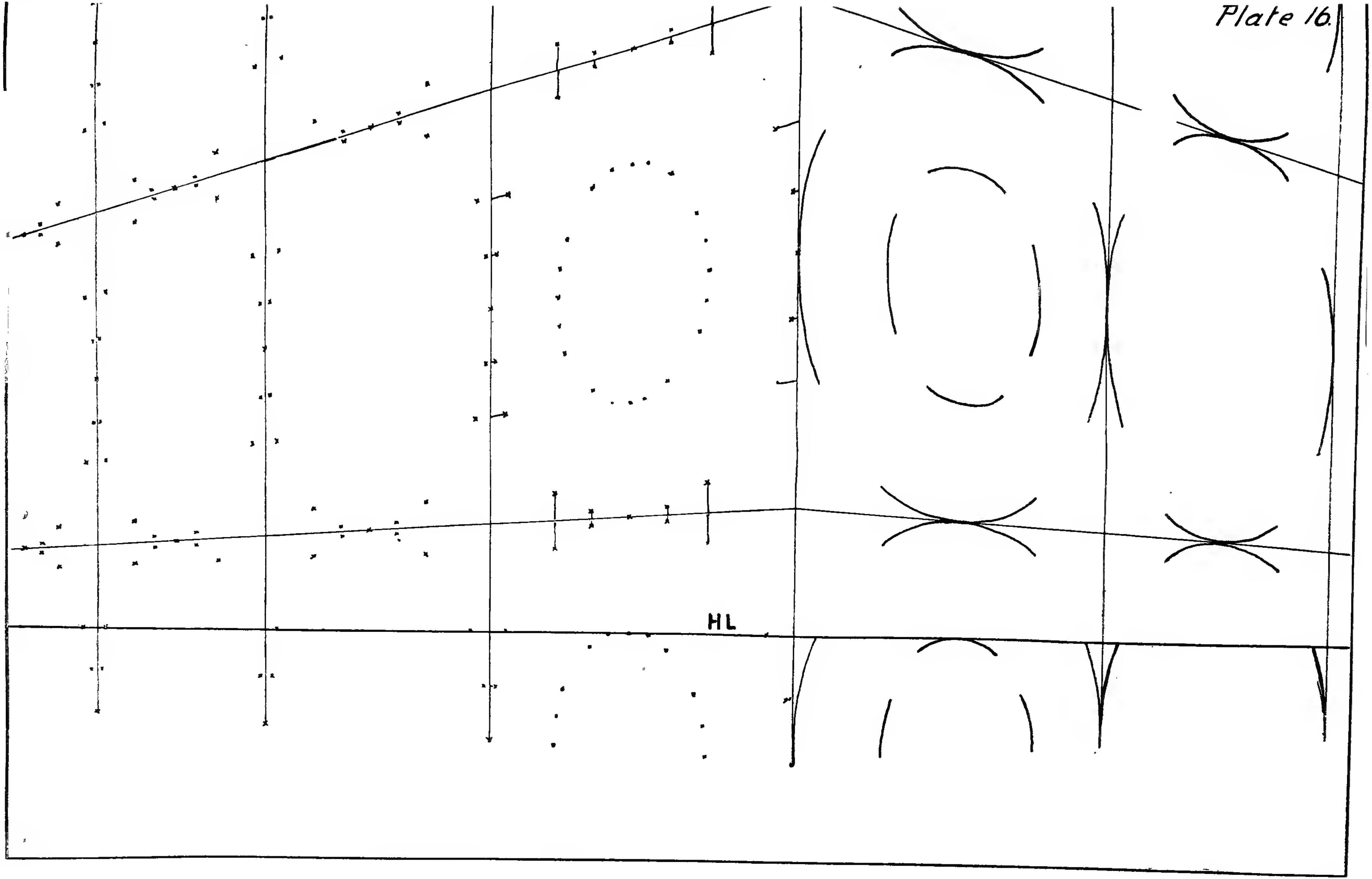


Plate 17.

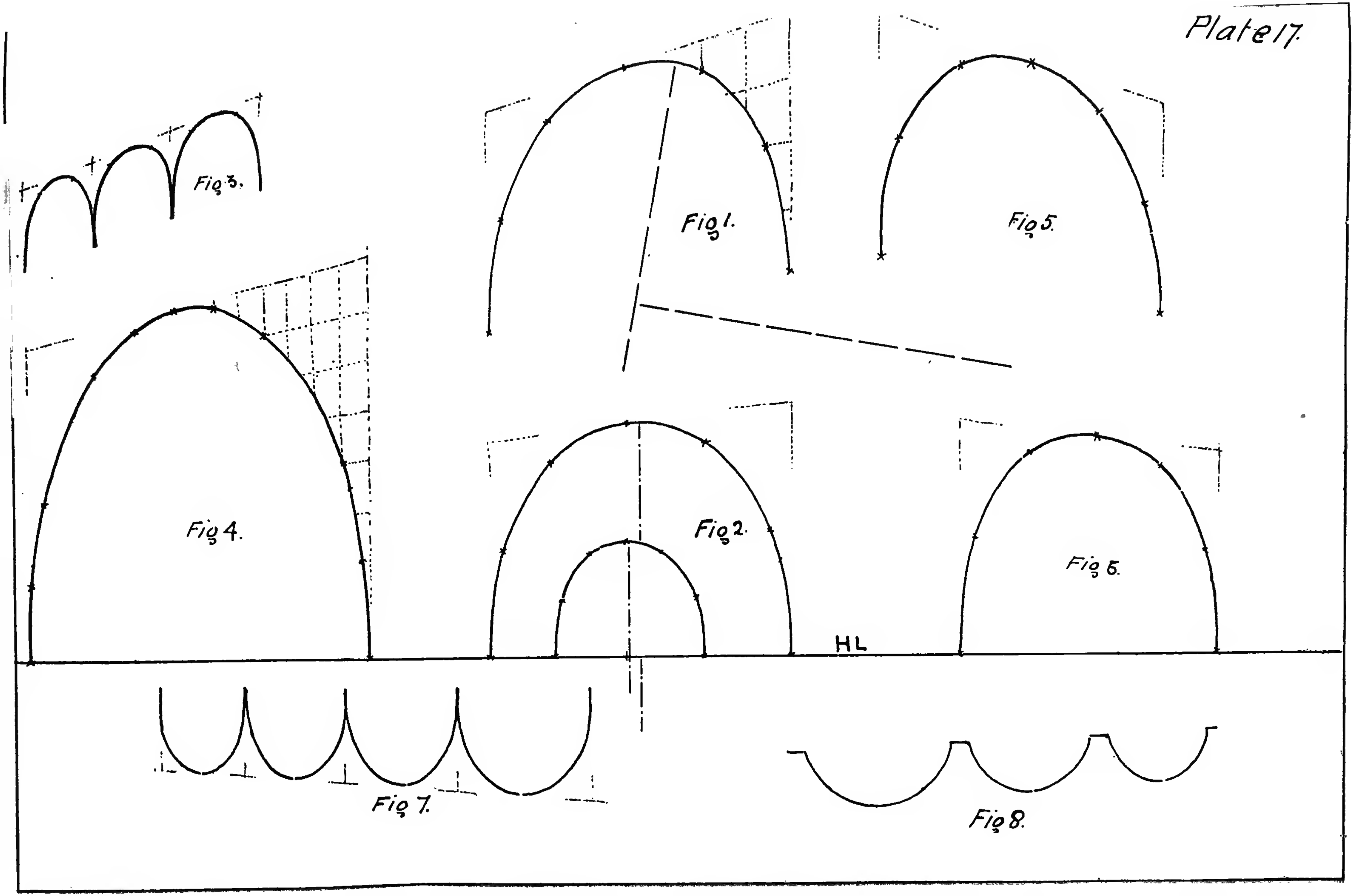
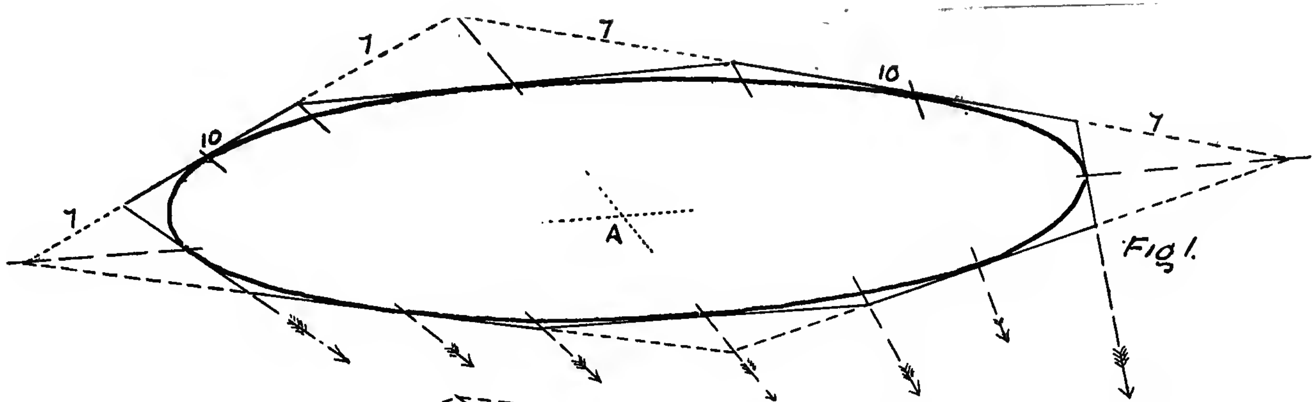


Plate 18.



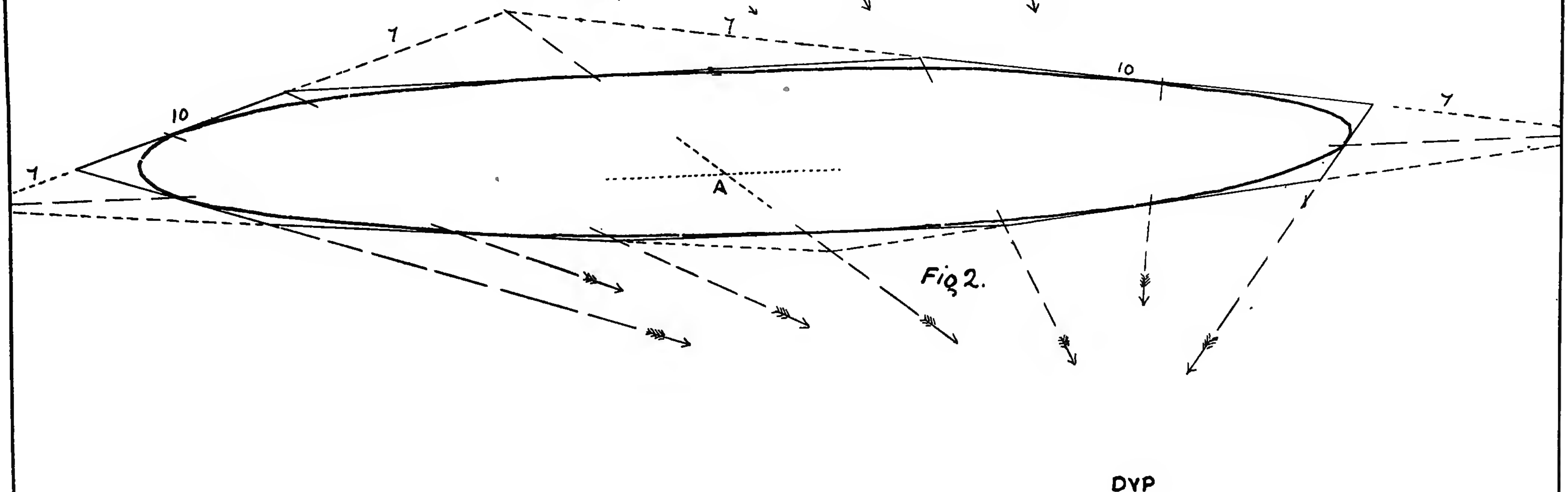
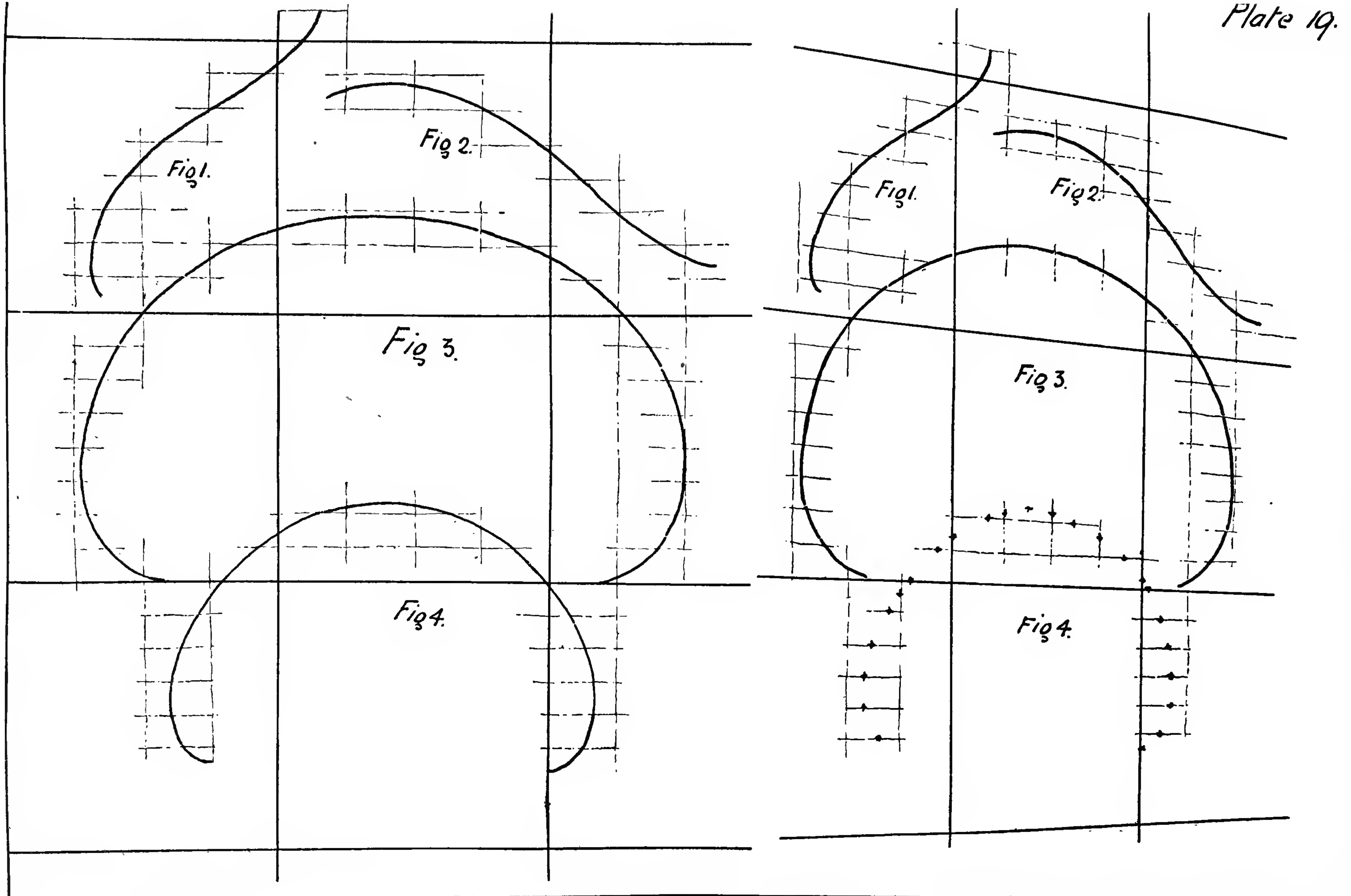


Plate 19.



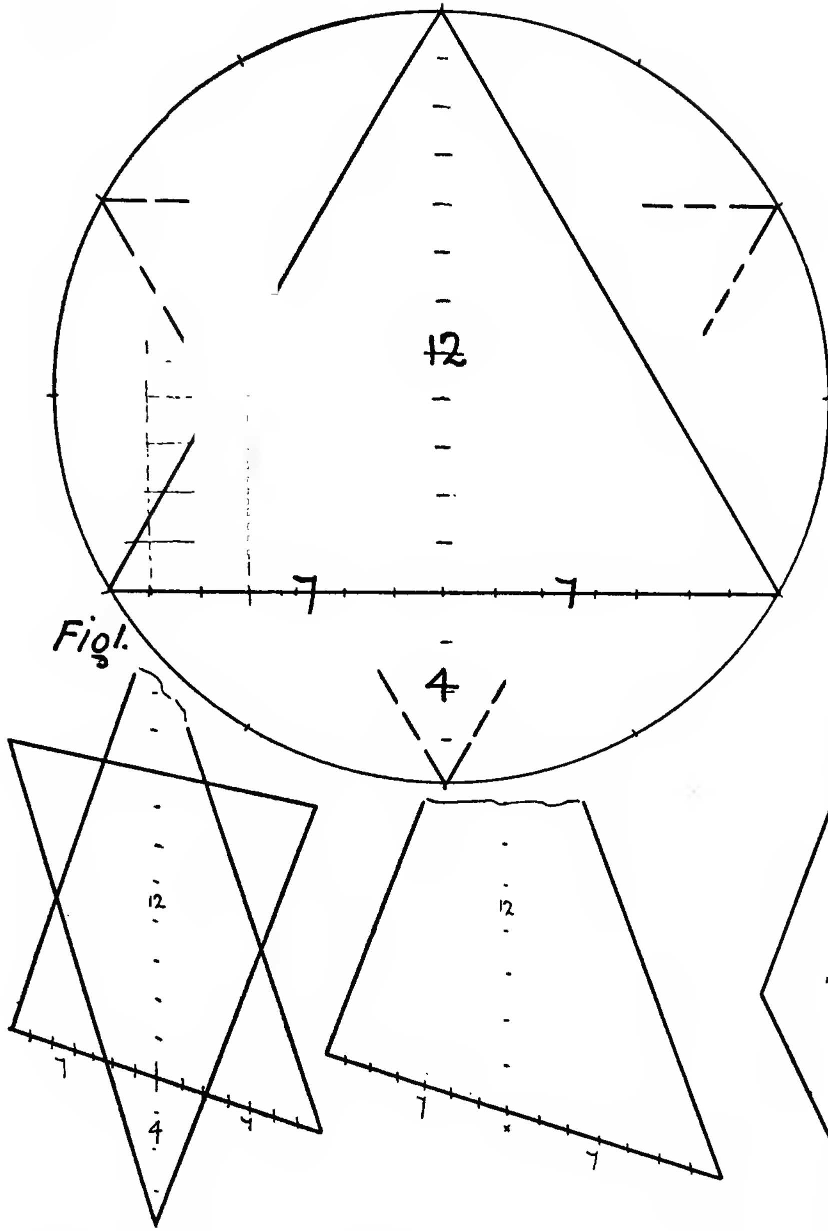


Fig. 1.

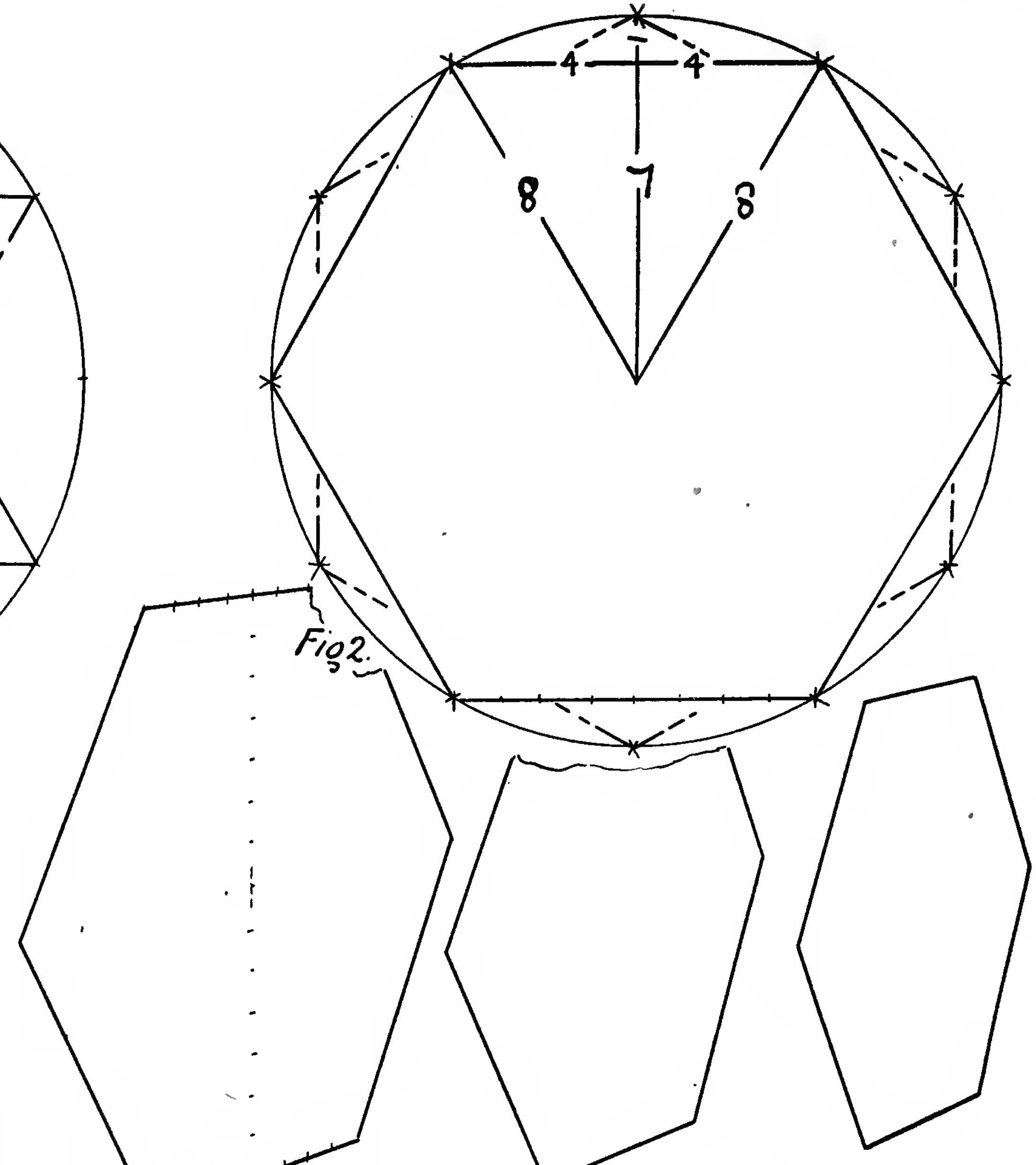


Fig. 2.

VII

MEASUREMENT IN PERSPECTIVE

Plate 21.—Fig. 1 shows the architect's method of dividing a line into perspective parts. The plan is arranged at the angle required, then lines are ruled from spectator parallel to sides of plan up to the HL. for the VPs. Lines are then ruled from the geometrical divisions on plan to the eye, cutting the HL. at the perspective widths of the parts on plan; verticals are drawn as required.

Figs. 2 and 3 show the measuring point method as generally taught in Schools of Art. Lines are ruled from the spectator (parallel to the planes to be represented) up to the HL. for the VPs., then from each VP. as a centre, and distance of VP. to spectator as a radius, arcs are drawn to the HL., cutting it at the measuring points. A pair of vanishing lines are then drawn to the respective VPs., and distances are set off on the ground line geometrically; from these ticks lines are drawn to the respective MPs., and these cut the perspective lines at the proper perspective distances. In these illustrations the geometrical distances are set off and indicated by capitals and large figures; the perspective distances by smaller figures and capitals ticked. Fig. 3 is for parallel perspective. In preparing the diagrams for R.'s "Method," I found each of these ways much more inaccurate in the results than I had anticipated, and not true enough for my standard scale diagrams; so, in the fourth and fifth editions, I drew the diagrams by a method giving better results. I cannot go into the details here, beyond saying that I most carefully set out a long distance, and proved its accuracy in several different ways, and then subdivided it by a contrivance that I am not at liberty to describe. However, the results are more accurate than I was able to get in the earlier editions, and much more accurate than the usual methods give. Process work, again, slightly distorted my first edition; the succeeding editions have been drawn on stone, and are free from photographic distortion.

Plate 22.—Perspective divisions can also be got by drawing from the geometrical divisions on nearest angle to the vertical DVP., as shown on Fig. 1, and to scale of the diagrams on Fig. 2, where on nearest angle the

geometrical distance from 0 to 4 is transferred to the perspective distance 0, 4; 0, $6\frac{1}{2}$ on nearest angle to 0, $6\frac{1}{2}$ on perspective line, and in the same way on the other side the geometrical distances are transferred to perspective distances by diagonals to the vertical DVPs.

Plate 23.—By drawing diagonals through the corners of a space (1 in height, 2 in width), twice the vertical distances are set off on the vanishing lines, see Fig. 1, where diagonals through the eight vertical spaces set off sixteen on the perspective line; these sixteen divisions are then set off on the top side of the figure by diagonals through these ticks and the centre. The easiest way of getting the vertical dimensions on to the remote side is by drawing lines from the ticks, through the centre, as shown on Fig. 2.

Figs. 3, 4, 5, and 6 show diagonals through one, two, three, and four squares, giving perspective extension of one, two, three, and four squares.

Fig. 8 shows how the diagonals, joining the vertical and perspective divisions, are themselves, by opposite diagonals, divided perspectively into the same number of parts as the other two sides of the triangle; thus 0, 8 is divided into eight perspective parts by diagonals; 0, 7 into seven parts; 0, 6 into six parts, and so on.

Fig. 9 shows how the perspective line AB is divided in the same ratio as A0 to B1, B2, B3, B4, or B5; for instance O5 cuts AB in the proportion 1 to 5; again O1 cuts it in the proportion 1 to 1.

Fig. 10 shows the line AB cut into the proportion of 3 to 5, by setting up measured lines at each end, and taking diagonal through ticks 3 and 5. Fig. 11 shows a right-angled triangle put into perspective, with its sides bearing the proportion of 5 and 8. Fig. 12 shows a similar result, a triangle with sides in proportion of 1 and ·9.

Plate 24.—In this plate I show several ways of dividing a line in perspective. Figs. 1, 2, 3, and 4 show a ridge divided into four perspective parts. Set up a line at either end of ridge, on it mark four parts, draw the diagonal; from each tick run sympathetic lines to the diagonal, and then draw vertical lines up or down as required; the ridge will then be divided into four perspective parts.

Figs. 5 and 6 show another method. From either end of ridge draw a line parallel to eaves, and mark on this line required number of geometrical divisions, draw from end tick through end of ridge to point on eaves; lines from this point to or through ridge to ticks on divided line will divide ridge into the required number of parts.

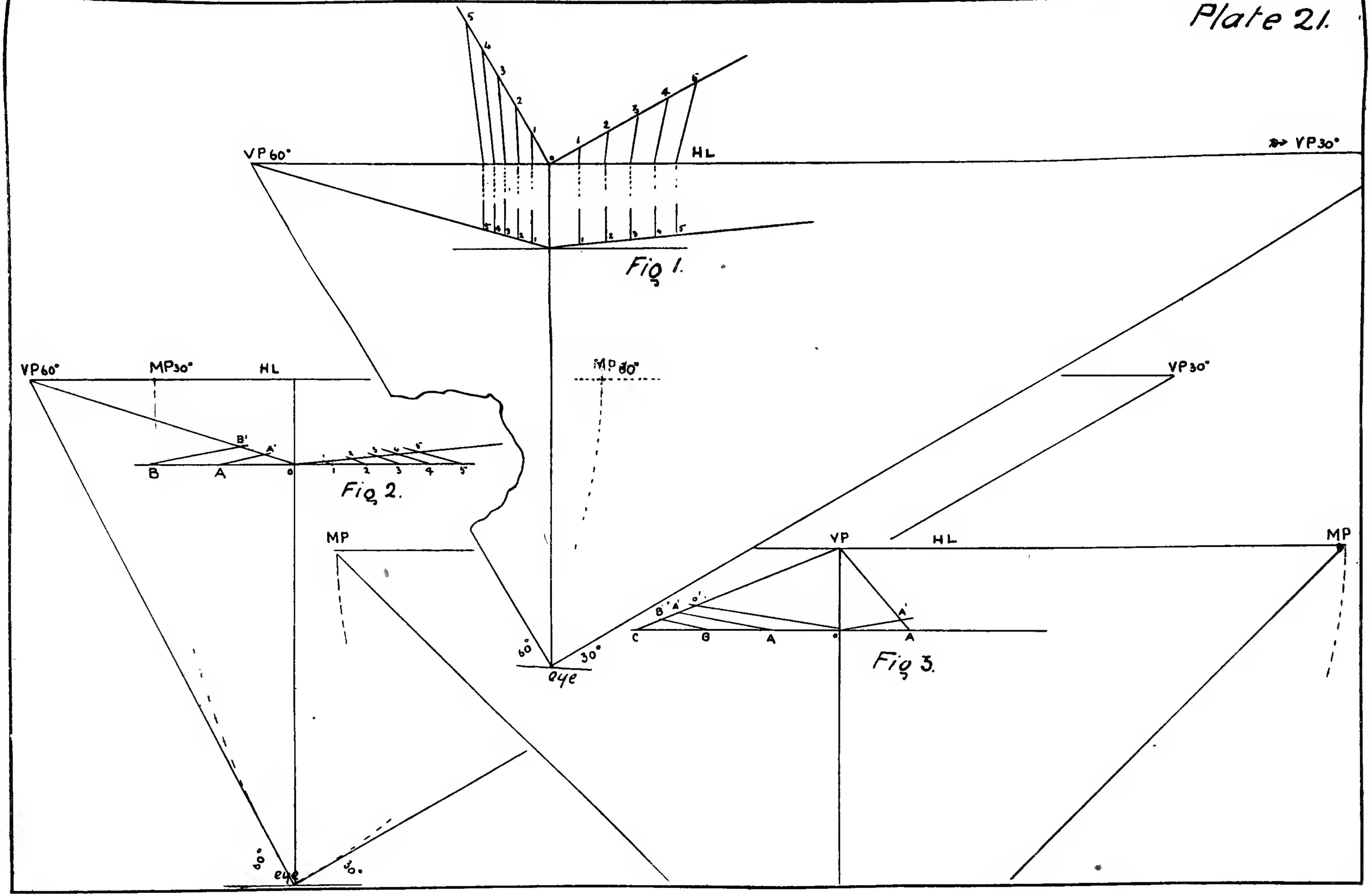
Figs. 7 and 8 show another method. Lines are drawn either up or down at either end of the ridge, and from set off dimensions on these vertical lines diagonal lines are drawn at angle of 45°. This method is very quick on perspective squared paper. Fig. 9 shows how the dimensions at one end can be transferred to the adjacent side, by first drawing sympathetic lines to diagonal, and then vertical lines to the required side. Fig. 10 shows an application of this. On the nearest corner the widths of windows and door are set up; these are transferred sympathetically to the diagonal, and from these verticals are run up or down as required. Fig. 11 shows how the width of one window can be transferred into the diminished width of second window by means of central point. Fig. 12 gives a useful hint in sketching. Here the central light of the three-light window is sketched in; by half height diagonals and a line on the top of window the widths of the first and third light are given.

PLATE 25.—A very quick method of dividing up the various roof lines is given in Fig. 1. By drawing lines through the ticks on two main planes to DVP. the ridge is divided up into the same number of parts as the building is long; in the illustration eighteen spaces or thirty-six parts. By drawing sympathetic lines from A to verge of gable it is divided into twelve parts at A′. By drawing lines from the vertical divisions on B to the DVP. the hip is divided into twelve perspective parts at B′, and by drawing through the ticks in vertical line C at end of valley to the DVP. the valley is divided into six perspective parts. Fig. 2 is a useful form of diagonal multiplying scale, crossing eight squares. Multiplying this eight by the number of vertical divisions you quickly get the position required. For instance, to get 40 feet, diagonal the 8 squares 5 down; to get 24 feet, diagonal the 8 squares 3 down; and diagonal of 8 squares, say at top of diagram, 20 feet up will cut the HL. at 160 feet.

Fig. 3 gives a way of cutting a diagonal into any required number of parts. The diagonal of a square of eight parts is required to be cut in ten parts. Add two parts down on one side of square, and two parts up on the other, and draw diagonals; these will cut the cross diagonal into ten perspective parts.

Fig. 4 gives another way of dividing the diagonal. The diagonal of a square of ten is required to be divided into six perspective parts. Draw a diagonal from 6 to 6 (through angles of squares), these angles will divide it into six parts; draw through these ticks to the point 0. These lines produced will cut the 10 to 10 diagonal into six perspective parts.

Plate 21.



VP 60°
HL
VP 30°
Fig 1.
MP 60°
60°
30°
eye
VP 60°
MP 30°
HL
B'
A'
B
A
0
1
2
3
4
5
Fig 2.
MP
60°
30°
eye
VP 30°
VP
HL
MP
B'
A'
0'
A'
C
B
A
0
A
Fig 3.

Plate 22.

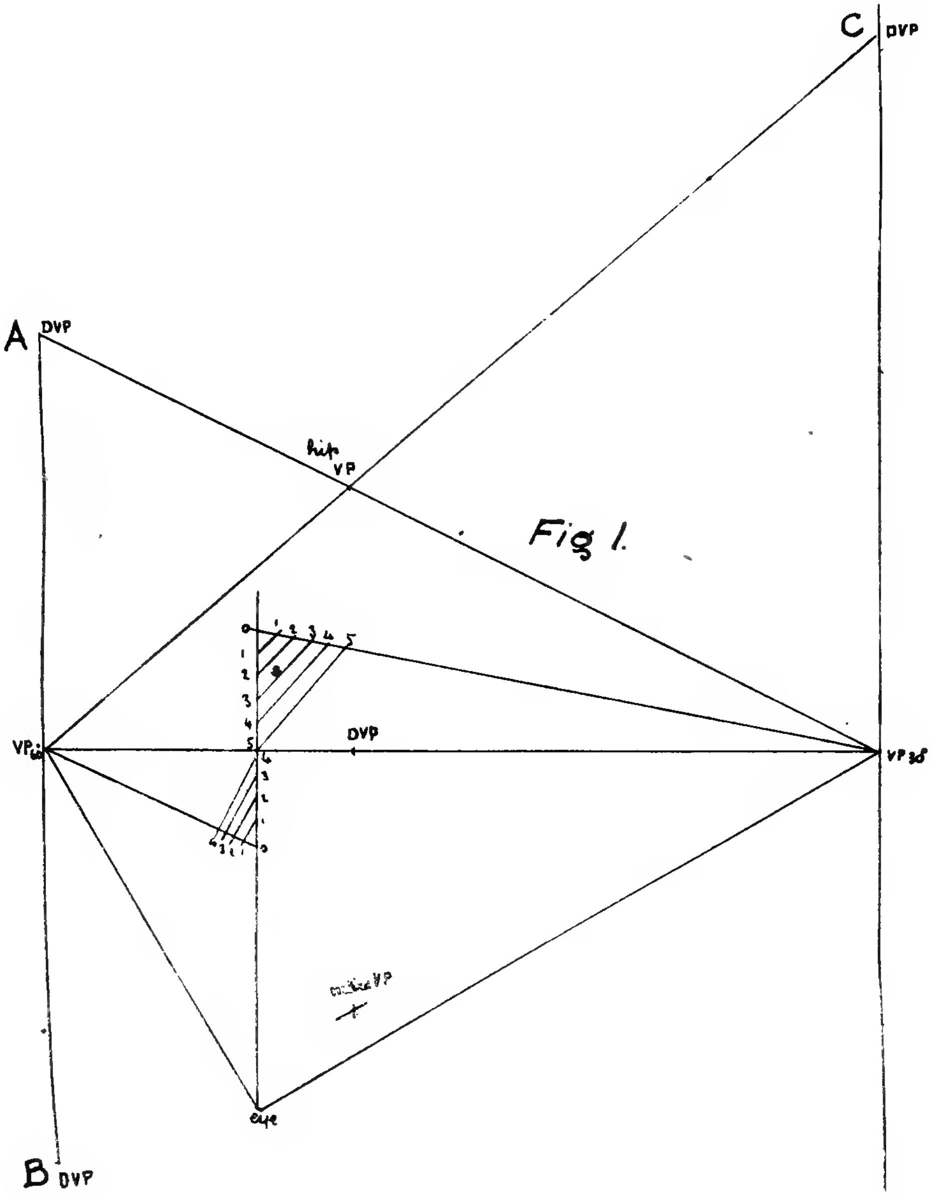


Fig. 1.

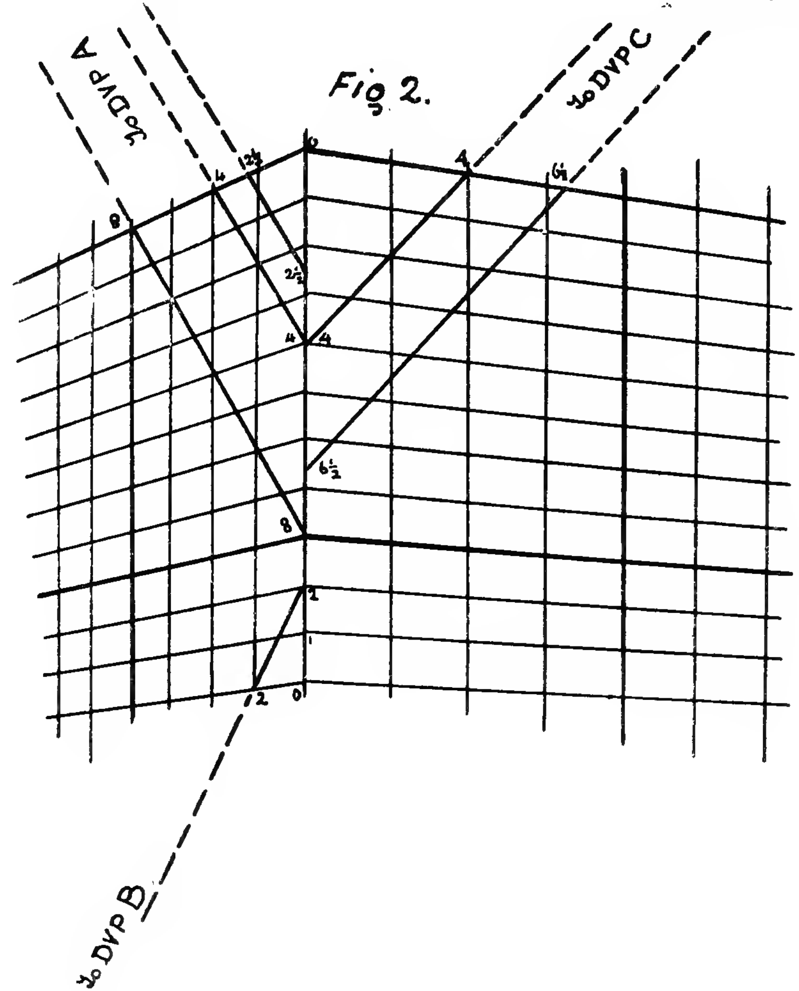


Fig. 2.

Plate 23.

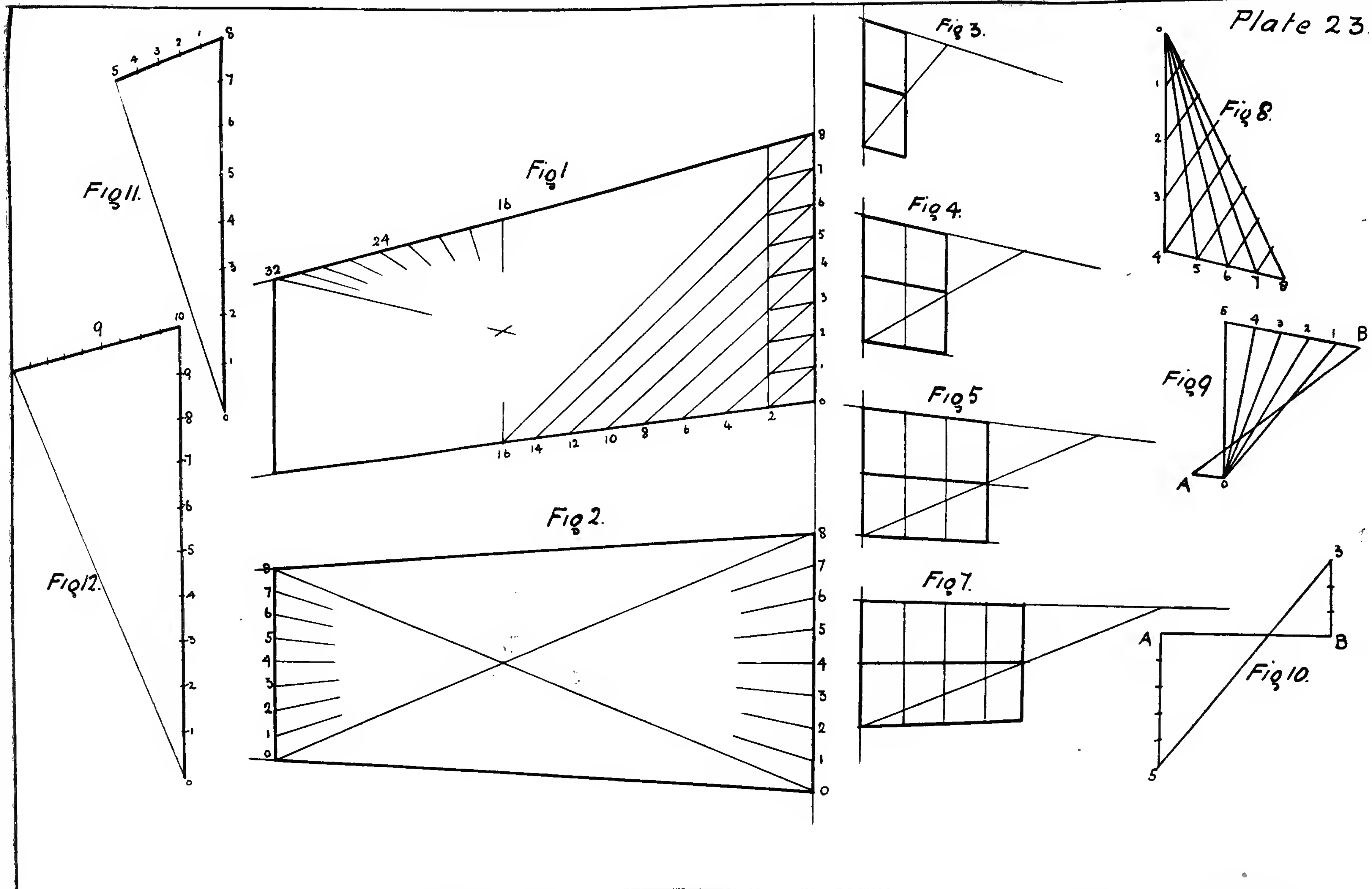


Plate 24.

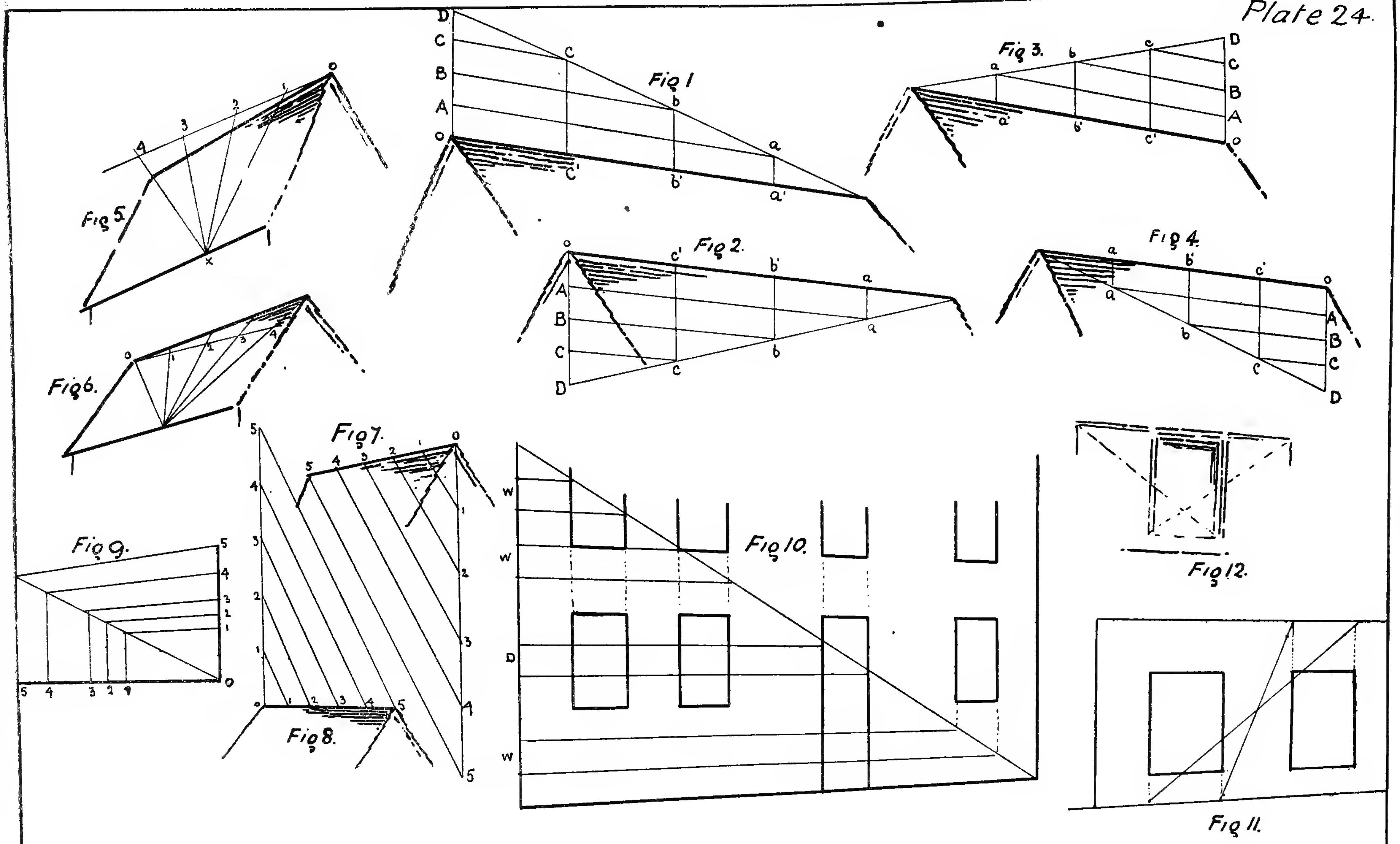
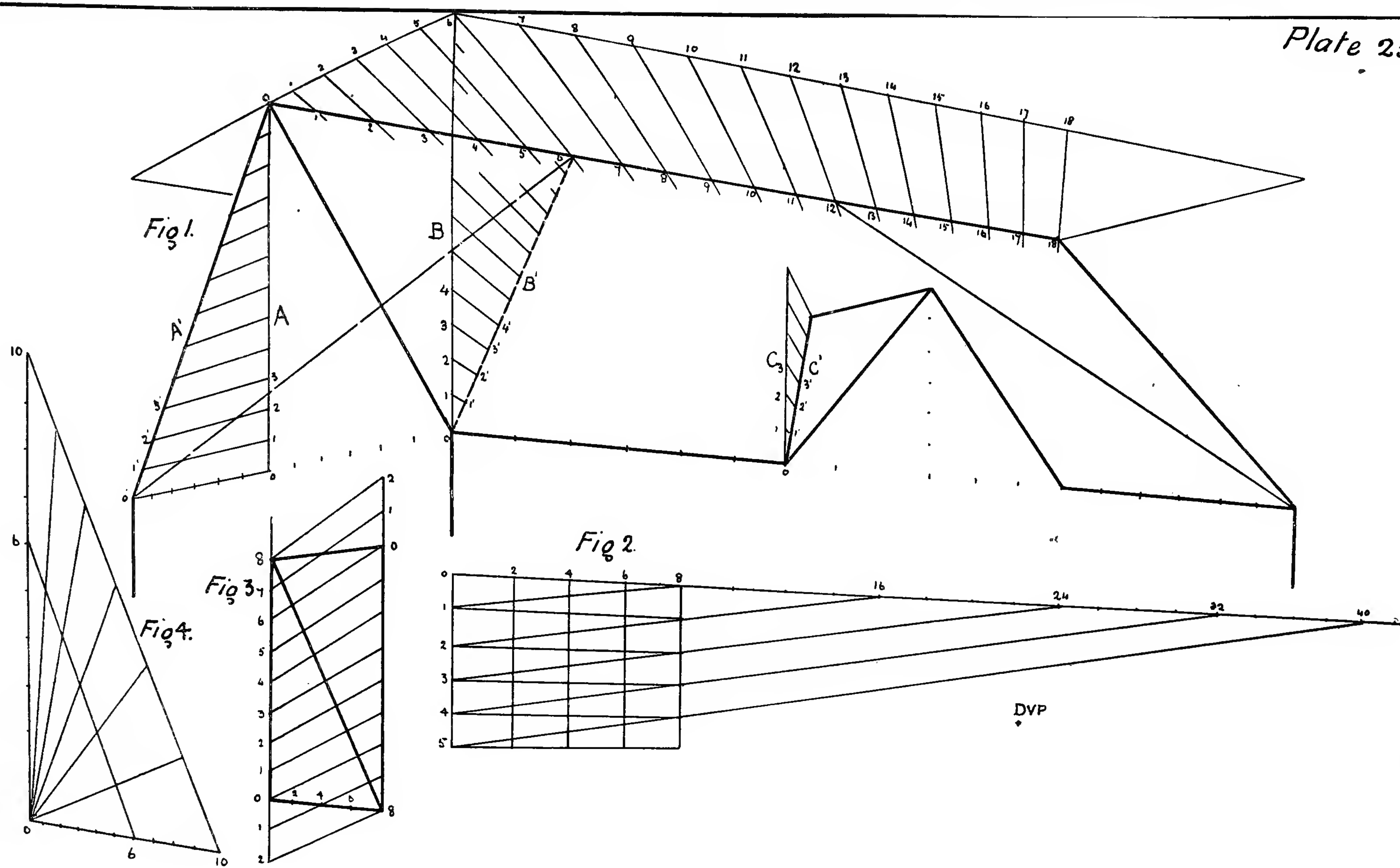


Fig 1
D C B A O
c b a
C' b' a'
Fig 2.
O A B C D
c' b' a
c b a
Fig 3.
a b c
D C B A O
a' b' c'
Fig 4.
a b' c' O
a b c
A B C D
Fig 5.
O 1 2 3 4 x
Fig 6.
O 1 2 3 4
Fig 7.
O 1 2 3 4 5
Fig 8.
O 1 2 3 4 5
Fig 9.
O 1 2 3 4 5
Fig 10.
W W D W
Fig 12.
Fig 11.

Plate 25.



VIII

DRAWING AND SKETCHING DETAILS

I OFTEN see perspective drawings passable all except the mitres, and I at once remember a student friend, a landscape painter, who was very successful with his drawings of sheep, all except their heads and legs, but as these vital parts were looked at and not approved, he did not readily sell his pictures. Now, the best way to overcome difficulties of this sort is to draw them as large as possible, so in Plate 26 I give a very large scale drawing of a pier twelve parts cube, the top part of which I make into a cap, which would probably be elaborately moulded, but which I keep a simple splay at an angle of 45° on sides; that is, as much projection as depth. Carefully find the centre of the bottom of the pier by diagonals, and from this point cut through point 6 on the nearest angle and corresponding points on the distant verticals. Then draw long and short diagonals at top of cube, these cut the mitres at the corners, join these points and the figure is drawn. The splay of the sides is the diagonal of 6 and 6, the mitre is the diagonal of 6 in height and 8½ in width; therefore the angle of the mitre is much flatter than the splay of the sides. This mitre vanishes about 11 inches below the HL. on a vertical line through the DVP., and corresponds with the 45° VP. of hips and valleys, which is about 11 inches above the HL. on the same vertical line. The two outside mitre slopes are flatter than 45°, and remain fairly constant, as their vanishing points are far removed; but the nearest mitre has its VP. very near and alters very much indeed, becoming vertical over the DVP., and always pointing in that direction, sometimes from the right, sometimes from the left, radiating like the spokes of a wheel; so if we carefully note its position at the nearest angle, and knowing that it is upright over the DVP. we get two fixed positions, and it is then quite easy to draw correctly the mitres round pilasters, or such details in any position of the picture. At 60°, 30° the nearest angle mitre is so near the diagonal of four squares on 60 side that it can be set off at sight to this inclination if at the top of the plate, and as diagonal of three squares at the bottom of the plate. I have marked the projection beyond the upright line in this position.

I have drawn part of another similar cap, and you will notice the outer slope of mitre about the same inclination, but the nearest angle mitre has gone beyond the DVP., so it comes in another direction to the one we drew first.

In sketching any such subject I most carefully draw this nearest angle mitre, let it cut centre, and this enables me to get the outer mitre lines much quicker and far more correctly than laboriously drawing all three mitres. This hint applies to a good many subjects that we from time to time have to draw.

PLATE 27.—To strongly impress this important fact of the radiation of the nearest corner mitre, I have shown on this plate a series of caps with nearest corner mitres marked A, and have continued these mitres towards their vanishing point about 11 inches below DVP. The mitres B and C show very little change of inclination.

PLATE 28, Fig. 1, is drawn to show a method of work founded on some of the principles we have already considered, and some not yet mentioned. For this subject I decided at once to take the nearest corner of the top part of buttress as the nearest corner of the diagram; we thus get the setting out of the widths of each buttress correctly. I generally clearly define in pencil the whole simple form of such a subject, and then add projections. In this plate I have indicated the simple form by plumb lines; these will enable you to see how the stages of the second buttress get beyond the first and how the third get still farther beyond the line. An inspection of the sketch will make this clear. I then indicate the direction and position of lines A, B, C, and D of the first buttress, repeating the same process on side of each buttress. I draw all these lines more easily from left to right, as indicated by the arrow marks. I then add the projections, attending carefully to the vanishing directions of mitres M, M, M, and series of hip mitres marked V, V, V; then I try to put the dark lines only where I see them. Fig. 2 is a very slight sketch, but it shows some truths of the work sketched.

PLATE 29 is drawn over diagram A reversed; the recessed parts are set out by means of long and short diagonals. Beyond the short description facing plate, I do not think it requires further explanation.

PLATE 30 is drawn over diagram A upside down; it is drawn by means of mitre lines. I have drawn a plan under with diagonals and sympathetic lines, the position of risers B′, C′, and D′ being found either by sympathetic lines from B, C, D cutting the diagonals, or by long diagonals drawn from 2, 2, 4, 4, and 6, 6, cutting the short diagonal.

PLATE 31 shows to a large scale the return of a cornice round a pier, showing a cut-off section at the wall plane. I have shown a plan above on which I have marked the main planes, projecting the outside members and recessing the others. This is a better plan than always accepting the wall as the main plane. In this case the wall would have only given me the perspective width of the back plane of pier, and as this does not show, it is of little interest; again, the top edge of moulding would have only given me two dimensions, whereas the plane I have selected gives me several important points at once to scale.

Plate 26.

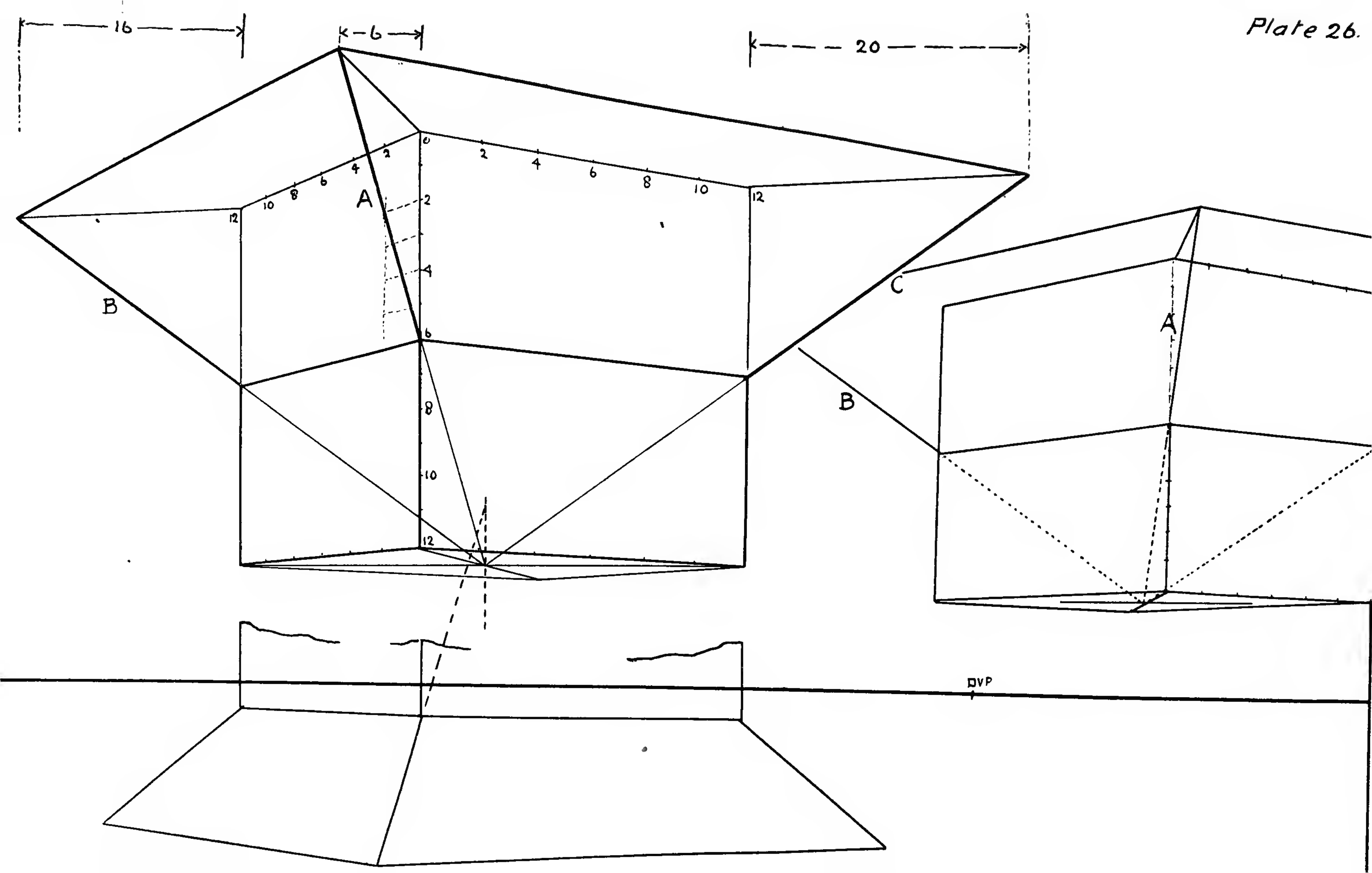
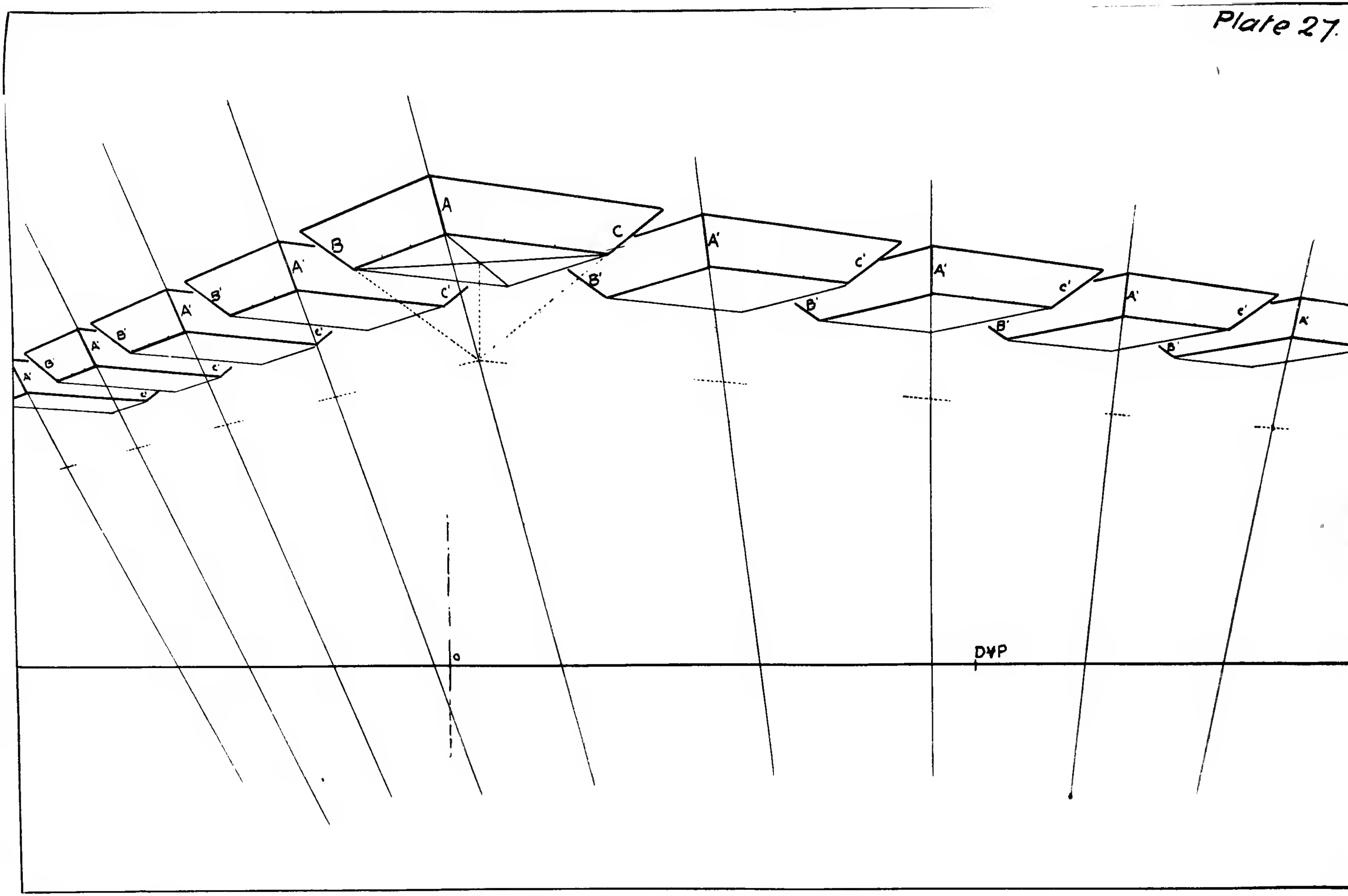


Plate 27.



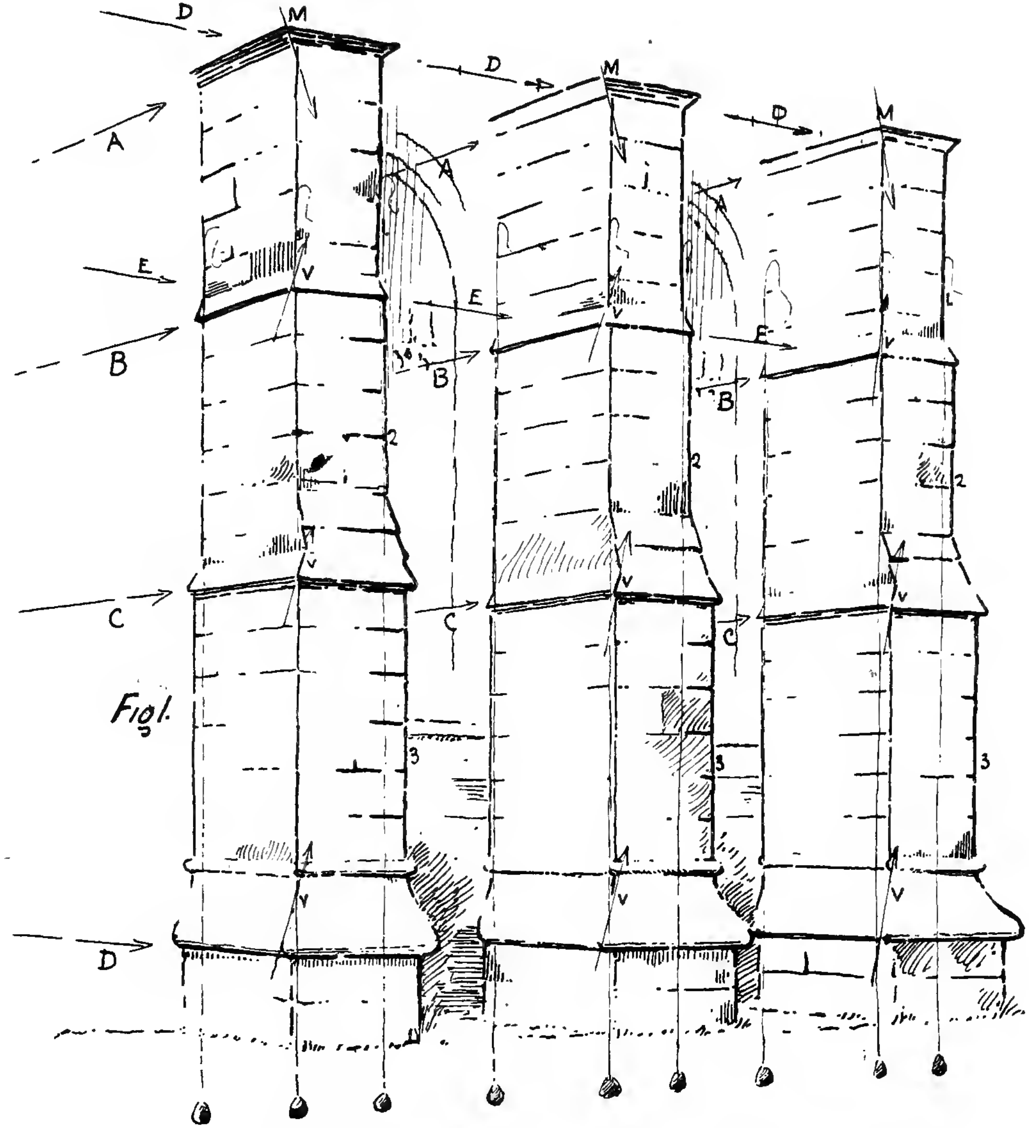


Fig 1.

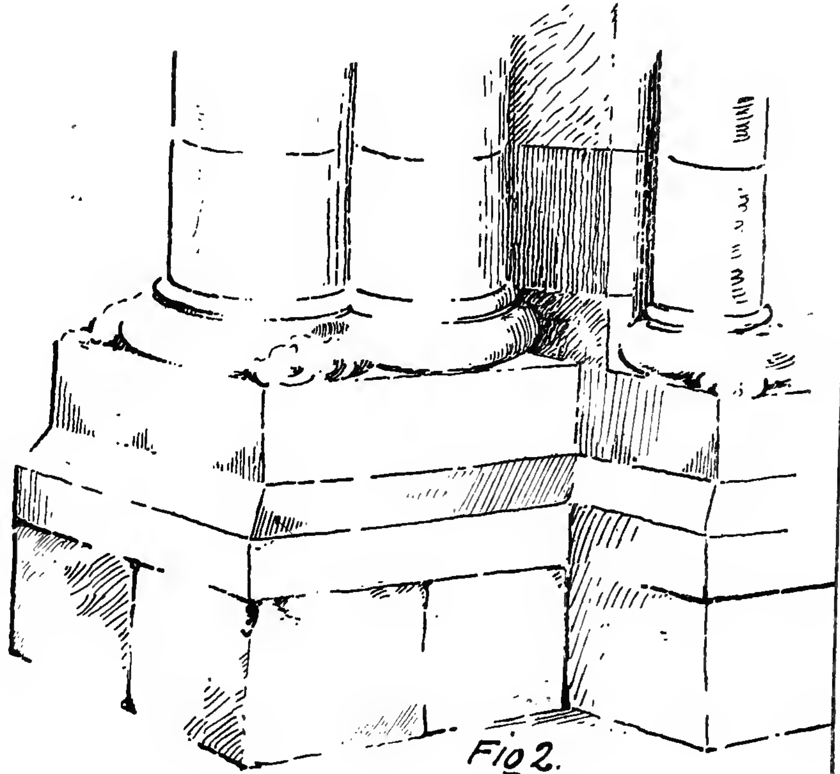


Fig 2.

Plate 29.

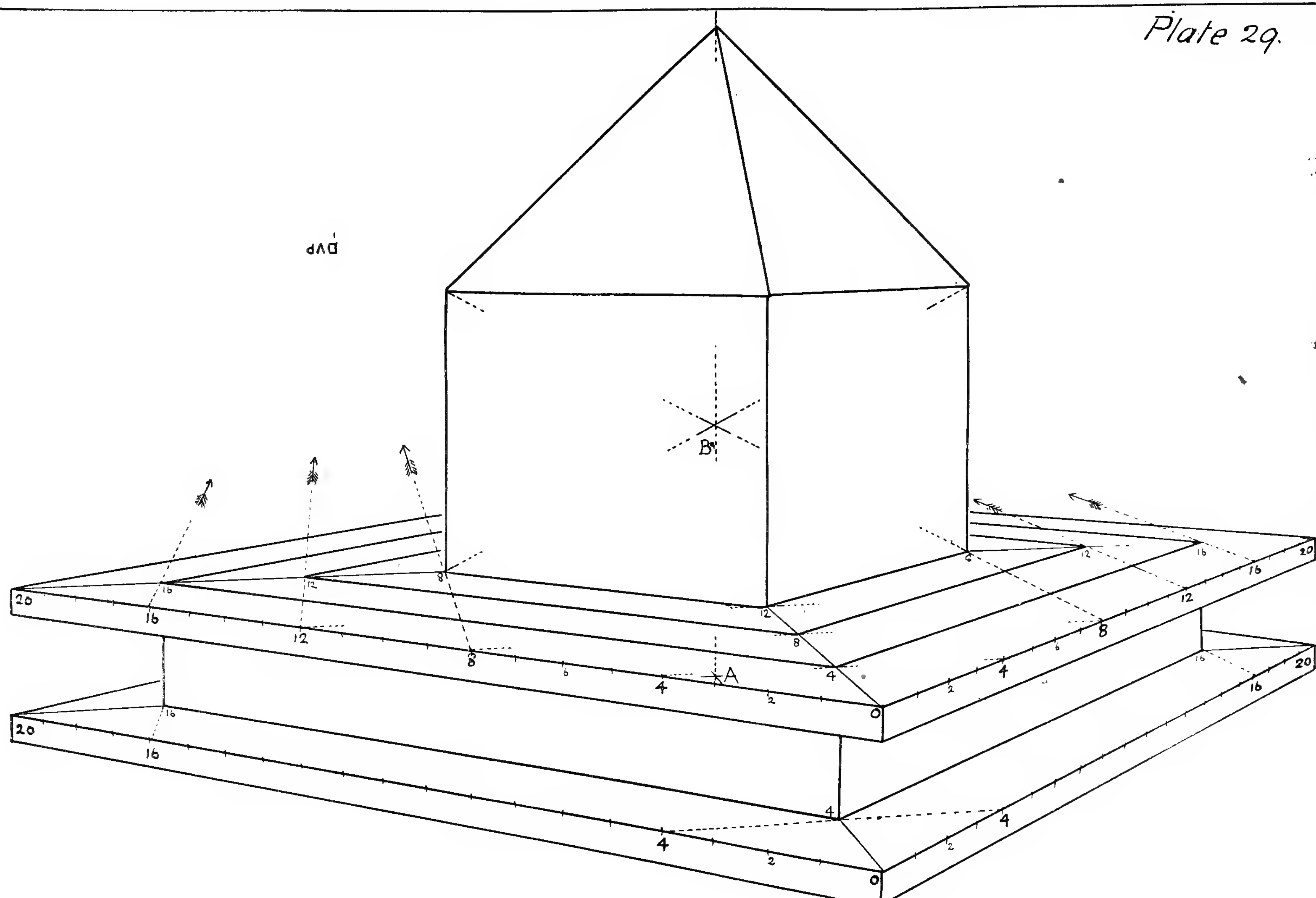


Plate 30.

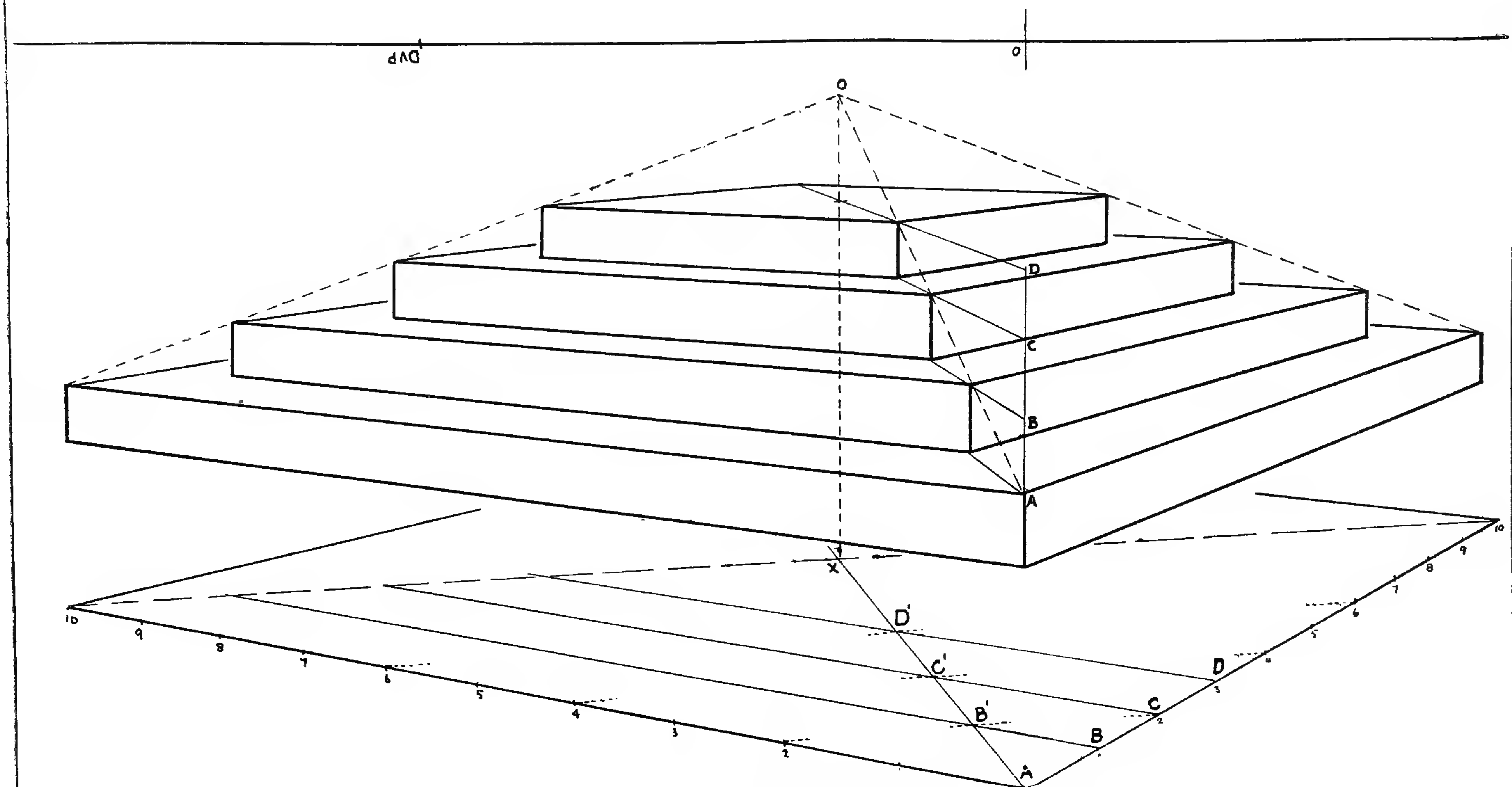
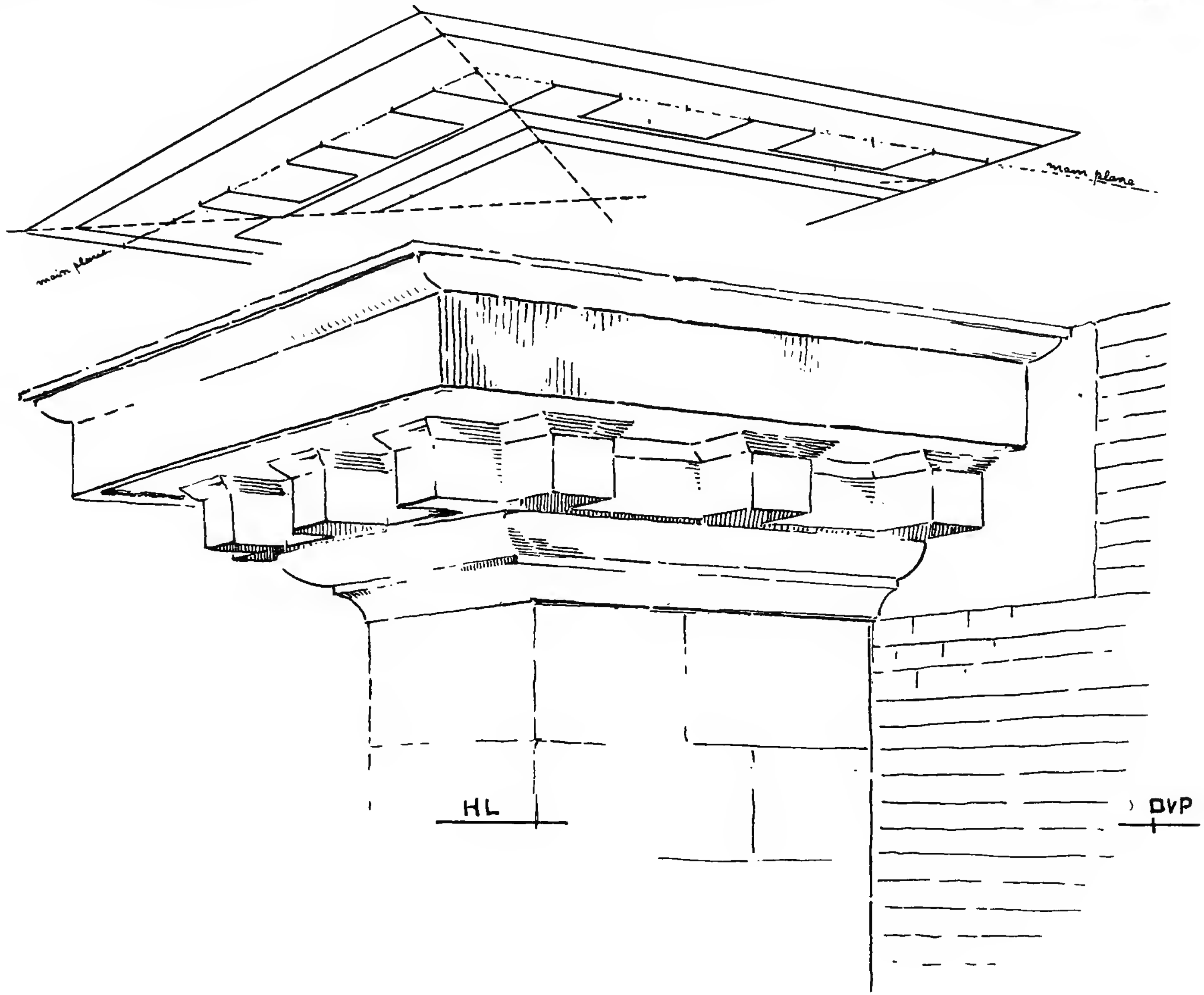


Plate 31.



IX

SCHOOL OF ART METHOD

To pass the Kensington examinations, it is necessary to specially study the method taught in the art schools. It is described in numerous books by art masters, and is generally regarded as one of the most difficult subjects they have had to pass in and which they have got to teach, as a subject required by the Department. New books seem to appear from time to time, full of diagrams, most elaborately scored over with about as many lines used to draw a drainpipe or a channel brick as some of our best perspective experts would take for a cathedral. Hatton's "Perspective for Art Students" is probably the best of the Art Master Series, because he leaves out so many unnecessary lines, and presents the subject bit by bit, showing only the lines that are actually required. Some of these books give two or three pages to describe the architect's method.

The weak points in most of this series consist of: (1) The unpractical examples given, such as a house 10 feet long, 6 feet wide, 7 feet high; can you fancy this as a house? Again, a grandfather's clock 10 feet high; this is rather tall. (2) The position given for spectator is nearly always much too near the object to get a pleasant view; hence the terrible distortion in most of the illustrations given as examples. (3) The quite unnecessary complication caused by putting the nearest corner so many feet back from the plane of the picture, and so many feet to the right or left. (4) The drawing of planes and solids in possible but improbable oblique positions. Now, for all practical purposes of drawing, we want to know all about planes and solids in everyday positions, not in most vexatious and unnatural ones. We want to know about simple forms standing upright, not about leaning towers or solids on oblique planes. We can certainly do without this sort of question, I quote from a recent book: "Draw in perspective a rectangular object 10 feet long, 6 feet broad, like a drawing-board, but disregard thickness; it rests on the ground at one corner *a*, 4 feet to the right and 5 feet within. It lies in an oblique ascending plane, which makes an angle of 40° to the right with the PP., and is inclined to the GP. at an angle of 35°; the adjacent edges of the board make equal angles with the PP." I have here briefly reviewed the *cause* of the failure of Perspective; the *result*, as shown in the Introduction, is, "I have found perspective in use in very few architects' offices in Great Britain."

PLATE 32 shows the working lines for a perspective model chart easy to make in thick paper. This will help you to understand the diagrams given in the perspective books we have been considering. You will notice at the apex of each triangle the eye—these as shown are what is called laid down. Now they can be picked up and all brought to the same point right out in front of the nearest corner of the small sketch, and on the level of the HL.; each of the four triangles will hinge on the thick dotted lines, and the points marked eye will be the position of the spectator. You will perhaps be familiar with the laying down of the point A, which is necessitated for the working out of a problem, but you may not be familiar with the laying down of points B and C, because they are not generally shown in this more simple position. Lifted upon their hinges (the thick dotted lines), and folded back on to the HL.; that is the position you will generally find them if shown on perspective illustrations. Again fold the point D over on its hinge and double down; that is the position it is often shown on a working drawing. If you make a careful tracing of this plate, and transfer it on to a piece of drawing paper, and cut through the thick lines doubling over on the thick dotted lines, you will have a model that will, with very little study, give you a much deeper insight into the illustrations given in school of art perspective books than you probably have at present. Cut out the semi-circles and sectors to better show the position of VPs. when the eyes are brought into the proper position.

The small sketch of a house with a gable at each end, and one in the middle of front elevation, is similar to the one drawn in the second Chapter (Plate 4). The first thing to do is to lay down the eye A, then you have the usual perspective diagram, showing the spectator A the VPs. 60° and 30° got by drawing lines through the eye parallel to the sides of the building; these lines cut the VPs. You can then set up the height of nearest corner, run the ground lines and eaves lines to their VPs., get the length and width of building, by processes already described, set up the other corners of the building, which is now ready for the roof, which you can make at an inclination of 45°. To get the working lines for this you must lay down the eyes B and C; you can lay them as shown on the plate or folded on to the HL. To get the VPs. for roof slopes, draw lines through the eye parallel to roof slope, or draw the lines at the angles of inclination of the roof, which is 45°. Draw these lines through B and you get the VPs. for the roof, one above the HL. and the other below. I have marked them DVP. because they are the diagonal VPs.; these points are often marked AVP. (accidental vanishing point). You can now draw your nearest slope up, and the distant one down, and from the apex draw the ridge to its VP. Repeating the same operation as described above, you find the vanishing points for slopes of gable on front of house, and having decided the width of gable you can draw the nearest slope up and the distant one down; and from the apex draw the short ridge; this meets the long ridge, so that the valley can be drawn in. I have continued this line to the valley vanishing point.

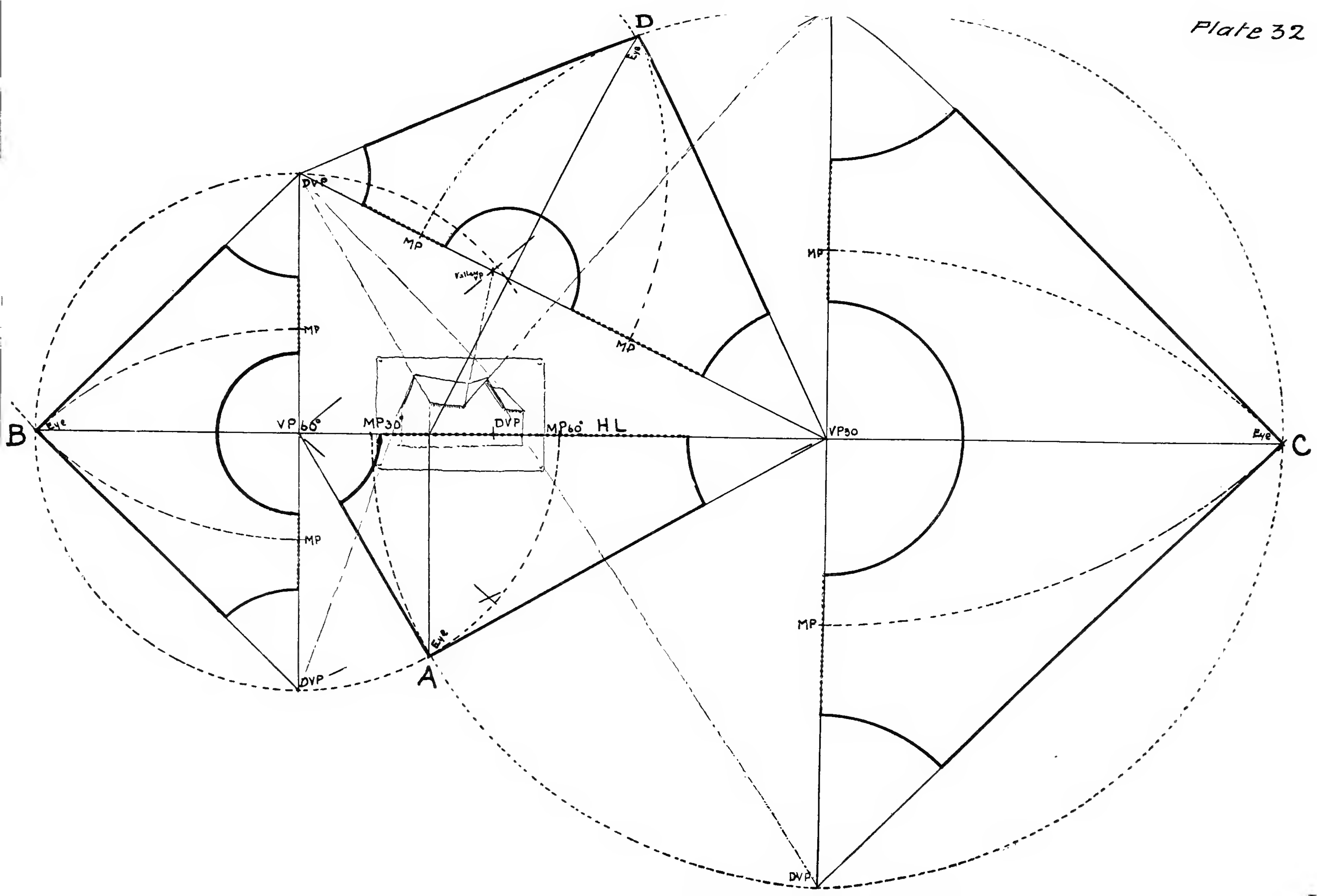
The long roof plane now has two vanishing points. The ridge and eaves lines vanish at VP. 30, and its slopes (inclination) vanish at the DVP., as shown on diagram; and HL. for this roof plane is the line through its two vanishing points. Now on this line all other VPs. can be found by ruling lines through the eye parallel to them, and the MPs. can be got as before described. The corresponding HL. for the other roof plane would be a line drawn from VP. 60 to the DVP. at top of plate.

The eye is called station point, spectator, or S; the shortest line to HL. is called axis, axis of PP., central visual ray, principal visual ray, line of direction, central line of sight, the distance, &c. The other end of the axis is called point of sight, centre of vision, or C.

These varied names are confusing of themselves, and a complete list of them would fill many pages. I have come across one writer on this subject who says there are seventeen different sorts of perspective. I will give you a few of his fanciful divisions, "dioramic, spheric, theatrical, military, naval, catoptric, siragraphic, ariel, and anamorphosic" (this terrible name I am glad to find he gives to violent distortion of a too near view).

I hope in this chapter I have made the general working of perspective more clear to some of my readers.

Plate 32



D
Eye
DVP
MP
Valley VP
MP
MP
B
Eye
VP 60°
MP 30°
DVP
MP 60°
HL
VP30
Eye
C
MP
DVP
A
Eye
MP
DVP

X

ARCHITECT'S METHOD—R.'S METHOD

THE plan direct or architect's method requires the VPs., found as previously described, but dispenses with the measuring points. A line, PP, is drawn through the nearest corner of the plan at the required angle; and the plan is then pinned on the top of a large drawing-board, so that the line drawn is right for the **T** square. A sheet of paper is then pinned down, with a cut edge to this line, the HL. is drawn about one-third of the height of the paper and a vertical line is drawn through the nearest angle; this is the scaled height line. The position of the spectator is laid down from the nearest corner, and through this point lines are ruled parallel to sides of plan; these will cut the plane of the picture at the VPs. Now draw lines from main corners of plan to the spectator, cutting the line first drawn; this will give the perspective widths on this line. These ticks as well as the VPs. can then be dropped vertically on to the HL. Set out the heights on scaled height line, and draw to respective VPs. All heights are got by first ticking them on this height line. For instance, the opposite and distant upright angle of a building would be got (if required) by marking its height on the height line from this tick, taking vanishing line to cut upright at other end of front; and, again, from this tick taking vanishing line along end to cut the vertical at opposite distant corner. The smaller details of the building are drawn in just the same manner.

By placing the PP. at a more distant point, and taking all the lines from spectator up to it, you can get a much larger perspective from the same plan; and by placing the PP. nearer the spectator you can get a smaller view.

The dimensions on height line must be arranged to suit the position chosen for the PP.

If the spectator is very high up (bird's-eye view), or very low down (building on a hill), the method is just the same, you simply put the ticks on line of height so that HL. is 20 or 30 feet higher or lower as desired.

On seeing my method, one of our best perspective experts said, "I nearly thought of that idea twenty years ago. I always draw a lot of vanishing lines lightly on each side of my paper, and then I only want the widths of the board to work on; but I never thought of getting the widths as you do, I always bring them down from the plan." Then in a few offices they use scales, pinned on sides of their boards. One man who had used scales told me of a serious mistake he made on a particular drawing in taking a cornice to tick 17 instead of 19, which threw the whole thing out. I used horizontal and vertical scales some years ago, and found them to a certain degree useful. I first made a horizontal scale to put a photograph into a geometrical drawing. R.'s "Method" has diagrams which are perspective scales both ways, or, more clearly, squared paper in perspective; and they are drawn by a method which gives more accurately drawn divisions than either the plan or measuring point version of the subject will produce, and the diagrams enable one to carry out all the processes of making a perspective drawing on the area of the paper. You can also very easily design in perspective over them. Vanishing lines are drawn in each direction, so no vanishing points are required, as lines can be drawn sympathetically to the vanishing lines either by eye or by the aid of a transparent celluloid set-square or straight-edge.

Measuring points are not required, as each vertical line cuts the vanishing line into a perspective scale.

The four vertical diagonal VPs., although a long way off, can be drawn to by means of diagonals through the angles of the squares. The DVP., diagonal vanishing point, marked on the horizontal line is of particular and most varied use in this method, as lines from it through the ticks on any line on main plane will perspectively divide lines on all projecting and receding planes, and on all planes at right angles to them. The long diagonals, which are almost always a matter of guess by architectural draughtsmen, and are little used in the measuring point method, are here capable of extended use.

Lines can be drawn at any angle either on plan or elevation at sight.

Squares and octagons are drawn at sight easily and quickly, each side of the octagon being ticked at the point through which to draw the ellipse, which represents the circle. The circle is analysed so that it can be drawn by hand geometrically on squared paper, and then the same proceeding on perspective squared paper can be carried out in varied positions on the paper on any of the planes dealt with. Subtle curvature can be very easily drawn in perspective.

The scale is universal, so small perspectives of the whole building and large scale details can be equally well drawn over the same diagrams.

Measuring and sketching to scale on the spot can easily be performed.

Drawings can be made on thick drawing paper by drawing over a tracing frame indoors, and outdoors by drawing over a sheet of glass or celluloid. Several water-colour sketches of buildings have been made in this way. Some of the makes of O.W. drawing paper manufactured by the Old Water-Colour Society are quite transparent, and are very useful for this method.

It has been suggested that my angles are limited. That is so, and I strongly advise a course of sketching from fixed positions and to a large scale, and have found, by doing so, many laws make themselves felt in such a way that they become definitely fixed in the mind, and save the sketcher from making many common mistakes in form; errors that can usually be found in the work of sketchers who trust entirely to the eye, and have no definite plan. Some I have heard actually ridiculing accuracy of form, and suggesting that feeling is the thing to aim after, not correctness. Now it seems to me right to see errors as little as possible in all we do; surely this must be the better plan.

I use the old architectural rule in sketching, "to stand three times the height away from the nearest point of any object." This, I find, gives an agreeable view. You are far enough away to get a pleasant and dignified representation of the subject, without either flatness or distortion. A view of a building from a nearer point so much enlarges the near part, and so much reduces the distant part, that the dignity and true proportion of the building is often lost. I have constantly seen this result in the home-made perspectives that hang on the walls in architects' offices. The size of the paper has often been the master of the position: the architect working to get his VPs. on the paper. Again, the camera, now in the hands of so many people without one iota of art knowledge, does serious harm by broadcasting ill-considered views.

I have repeated above the same principle of choosing the position to sketch from as I gave in Chapter II.; as I think this cannot be too well considered. I have also at length shown how to stand in position for the various diagrams, and you will find your sketches made from these positions particularly useful in after-life as fixed facts truly recorded.

Your sketches over the 45°, 45° will have equal parts of equal length on each side of nearest angle. The DVP. on the nearest angle will be the VP. for all diagonals on any horizontal plane; and all oblique diagonal lines will vanish to points on a vertical line drawn through this DVP.; the nearest hips and valleys going up, the nearest mitres going down.

Your sketches over 60°, 30° diagram will have equal parts on the 30° side, about twice as long as those on the 60° side (starting from the nearest corner); the DVP. is marked near middle of 30° plane. In looking at a building this DVP. can generally be located by the upright mitre line, and I find this very helpful all through the sketch. It is always a safe place to begin a sketch, and work each way to right and left. For some subjects you will find this hint of value. On the sixth edition, diagram A, the DVP. comes perspectively about the centre, so if two bays of an arcade occupy the space from the nearest angle to DVP., there is just room for two more bays on the sketch.

A high grade pencil, or a Swan stylo filled with one of the Swan coloured inks for architects, I find the handiest for sketching with, as I always have these things in my pocket; then the lightest sketch-board I can get completes the outfit. In a lifetime one goes through many stages of outfit. I have met men quite distinguished by their outfit, perhaps more so than by their work. A seat, some contrivance to hold the sketch-board, and a waterproof case to protect paper and drawings are desirable luxuries that we can do without; perhaps a trifle better with. If we were millionaires we might have a studio fitted on to a motor, but we might even then not draw much more correctly.

XI

SKETCHING FIGURES—FOLIAGE

In architectural drawings, the figures and foliage represented are often of a species not known on this earth, at least not commonly met with, and the principle of putting them in to the right scale is not always understood, so I venture to call attention to this matter, and to try and make it clear.

Plate 34, Fig. 7, gives a slight sketch of a figure showing the usually accepted proportions—the head one part, the body three, and the legs four parts; now see Fig. 1. If you look at a figure a certain distance off, say the man at the picture plane, and there is another figure the same distance beyond, the figure will be half the size of the man; another figure the same distance farther away will be one-third the size of the man, and so on; four times the distance one-fourth the size; five times the distance one-fifth the size: these results are shown at Fig. 2, which gives what you would see on the picture plane. You will notice the HL. goes through the head of each figure, but as the full height of Fig. 1 is only half the size of the man, we know at once she is twice the distance away. All objects in Nature are governed by this law, so by means of objects of same height, say telegraph poles, you can readily calculate distances; this is worth thinking about. Now in Fig. 3, drawn to a larger scale, the HL. is taken at 5 feet. I tick off 1, 2, 3, 4, 5, and from 0 run any line in perspective; then if you want a figure at *b* back, drop vertical at *b*; then a horizontal line to position for feet, and draw figure B. If you want a figure at *d*, drop vertical and run horizontal line to position for feet, and draw figure D. Fig. 4 gives you the same principle when the HL. is 3 feet 6 inches high; the lines from 0 and 5 run to VP. will in this case run up and down, and the figures will diminish up and down, the HL. cutting all the figures at the same height. Fig. 5 shows figures with the HL. at a height of 9 feet, and Fig. 6 gives the HL. at 18 feet. Of course the mechanical look of the figures at regular distances, and all coming the same way, is not the sort of thing you require for an architectural drawing, so avoid this and get as much freedom and variety as you can in your work. I have kept most of the figures purposely about the same height to show the principle.

The forms of foliage and trees, again, want serious individual study, if your aim is high as an architectural draughtsman, but a few hints and a certain amount of help can be given. Try to realise that tree form is not flat, but round. A tree is not expressed by a trunk and branches on each side; there will be similar branches coming forward and going away from the trunk; just think this out, and you at once see the nearest part to you will come forward, and you must try to suggest this from the start of your study of the subject. On Plate 35 I give three pages from my sketch-book which will, I think, make this matter clear. The plate shows another point which you may not have observed; they are all grand trees of their respective sorts. Now, there is an awkward time for trees, when they have not yet attained their full growth, and an artist would hardly sketch them in that stage. In a number of trees or in a number of flowers there are about as many distinguished for their beauty as there are in a number of people. The artist will wisely discriminate, and select the beautiful for representation. Trees are very useful in an architectural sketch, to take off the bareness and fill up ugly angles in the architecture. I often feel thankful to the generous and compassionate ivy, which fills up the awkward parts, and to the virginia and other creepers which cover the ill-considered details with which man has belittled his work. Thirty or forty years ago there were acknowledged methods of drawing trees, but now many fantastic means are employed which don't always suggest trees, and those of us who have sketched much from Nature are not altogether persuaded that these eccentricities are any improvement on the old methods. Nearly black masses at the back of a building are generally bad; they certainly make it stand out pretty sharply.

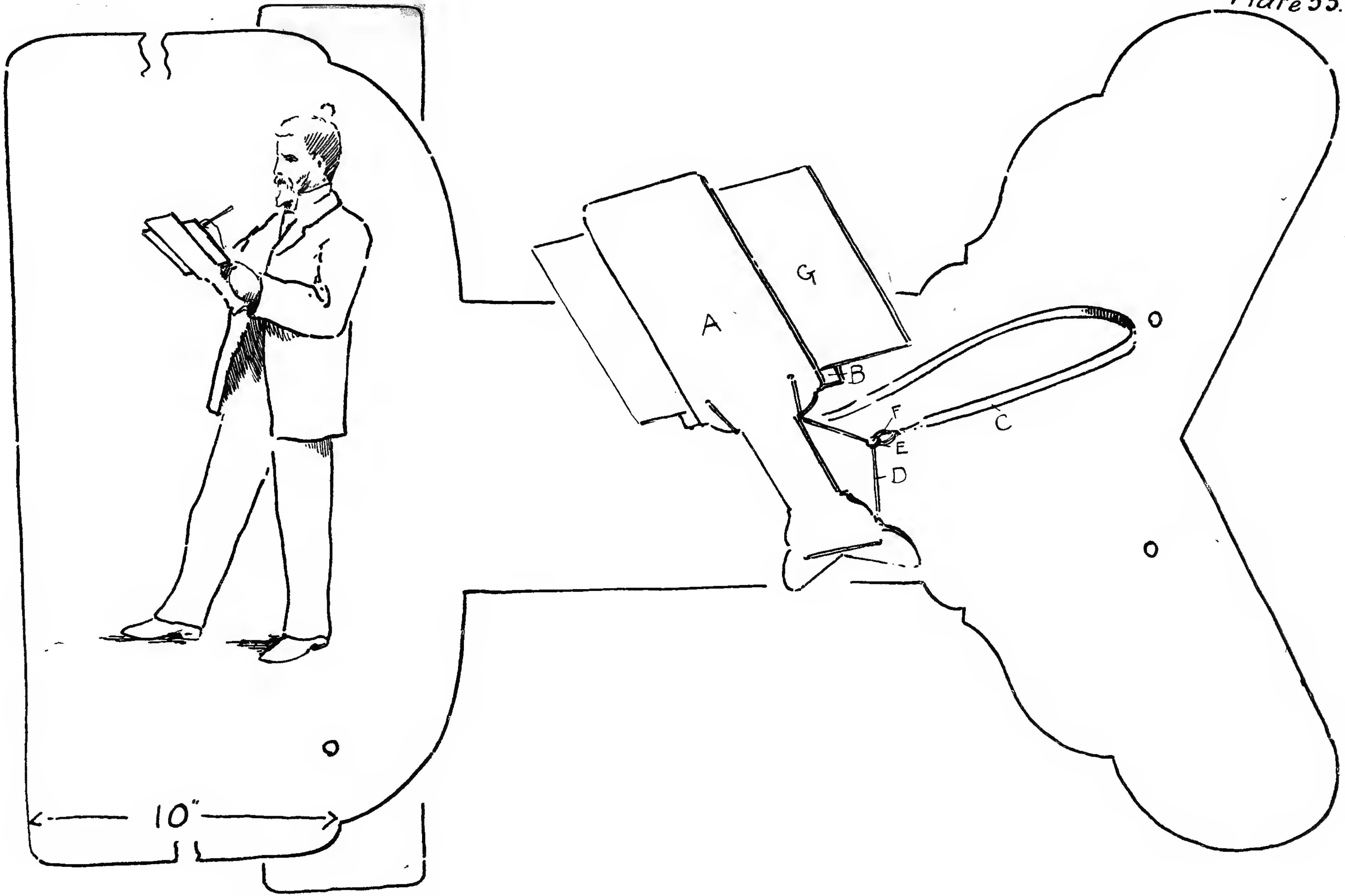
In drawing foliage, you can only suggest, you can't get in, the leaves, but the shape of the tree should show its species; and you should aim at showing the form of the grand ovoid formed masses, remembering that there must be a "lose" and "find" about these masses, just as you always see in the clouds. There is a part where the form stands out strongly, which I refer to as the "find," but there will certainly be a part where the form loses itself, that is the "lose" I refer to; and there will be the gradation, sometimes regular, and sometimes abrupt, between these effects. This law is, I know, constantly ignored, but, it may be, some have never realised its truth in Nature. Years of study as an artist, picture making (I, of course, mean from Nature), is the receipt for anyone who wishes to make artistic architectural drawings, for you want to know something about light and shade, and a good deal about composition, if you propose to go far in this direction. It is yet helpful to remember that several of our distinguished architects have also been distinguished draughtsmen; so with this before you, go on meaning to succeed in due time, and all real lovers of their work will get a share of this desirable power.

Plate 36.—Figs. 1 and 2, again, show the grand masses of foliage I

have referred to. In Fig. 3 I have just sketched a corner of my garden, where one wall in sunlight makes the rose-coloured hollyhocks and tender green foliage look quite dark, while the shade on the other wall makes that portion of the same growth look quite light. This little trick of light and shade we constantly see in Nature and use in our drawings.

Fig. 4 is a slight sketch I made of a fine growth of bracken. Here, I remember, very little distinct fern growth was visible in the tangled mass of Nature, but I tried my best to represent what I saw in a simple manner. It may be somewhat difficult to grasp, but it is absolutely true, that perspective gives the power of correctly drawing figures and foliage. The same rules for distance of spectator will produce the agreeable; the disregard of them will give the terrible distortion so many photographers are making us familiar with.

Plate 33.



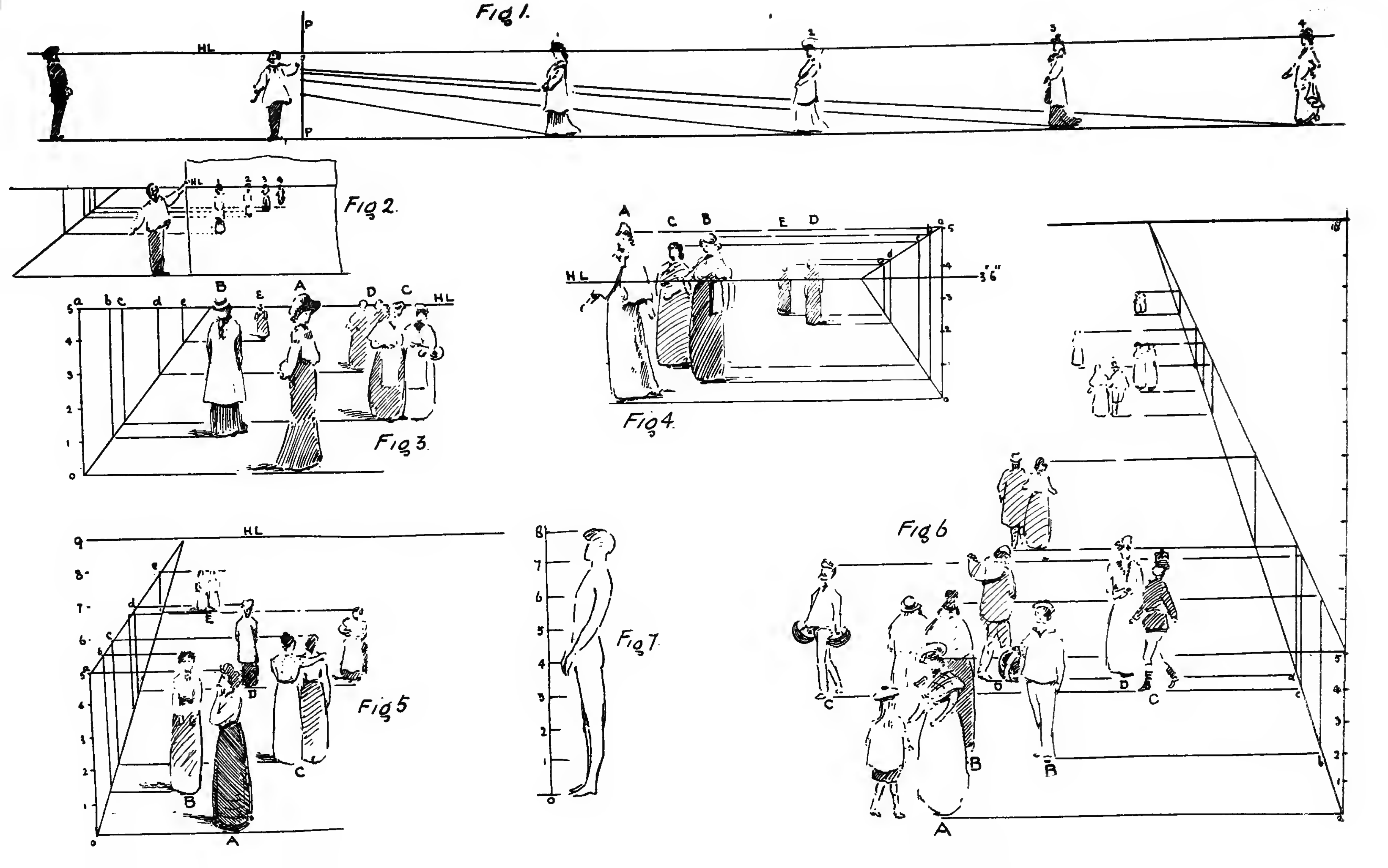


Fig 1.
HL
P
Fig 2.
HL
Fig 3.
Fig 4.
HL
3' 6"
Fig 5.
HL
Fig 6
Fig 7.

Plate 35.



Plate 36.

XII

THE ART SIDE OF IT

I HAVE devoted a large amount of my available space to show how to get correct drawing ; now I, in one brief chapter, must review the art side of the question. We find all natural objects, and man's creations, with their individual form and colour in full light and shade, yet constantly changing with the varying conditions of light through our varying conditions of atmosphere. An artist after long study can more or less represent these objects by means of light, and shade, and colour, selecting and leaving out all he does not care to show. A camera man can more or less represent these objects in light and shade, without colour, reproducing everything without the power of eliminating any parts. An architectural draughtsman or black and white sketcher can more or less represent the true form, and suggest, without attempting to reproduce, the light and shade and colour. Each of these three classes are considerably graded, the men at the bottom producing the commonplace, and the men at top ever seeking for and attempting to reproduce those phases of Nature when the great artist is picture making, with his sunrise and sunset, with his subtle shine and shade. If objects are studied under these glorious conditions, a far higher standard becomes the aim, and a man is no longer satisfied with the commonplace. I don't propose to give illustrations, but look back in the trade journals, see the immense amount of work in some illustrations of architectural subjects, see how little effect; contrast this with some drawing where the few lines and touches of a master in art suggest the whole thing. It is very instructive, on a day when the clouds are every few minutes obscuring the sunlight, to stand in front of a building and first notice its light and shade when not in direct sunlight, and see how different when in sunlight; some parts being considerably lightened, other parts seeming much darker by contrast, but really being the same grey as before.

This grey-day light and shade of a building should be first studied and understood before one attempts to delineate the magic of sunlight; yet always remember sunlight in a sketch as in actual experience is so much the more enjoyable. A study of the same building on a wet day will teach you much about reflections. The means of getting the highest kind of knowledge of such subjects are always close at hand if we will but look for them. I will now briefly suggest the germ of truth about light and shade on a grey day,

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and leave it to you to develop as far as you can, with the assurance that for this study you will get your reward.

God's light generally shines from above, and all horizontal top surfaces reflect it more or less, still more if they are polished; therefore all roads, flat lands, fields, and meadows must be very light in tone. Note the grey top light on all trees and leaves of trees and plants, how very light it is; the smooth shining surfaces such as water, polished marble floors, &c., are nearly as light as the sky itself.

Hillsides and sloping surfaces, roof slopes, and all such inclined surfaces reflect more of the light than vertical planes, and are light in proportion to being at right angles to source of light.

Vertical surfaces are light when facing the source of light, and darker as the surface is turned away from it, therefore one side of a building is generally darker than the other.

If the front of a building is in sunlight, then all those parts where the sunlight can't reach are in shade, and the side of the building not getting the sun will just show its normal light and shade produced by its own individual form. Now, all under surfaces not getting the light will be still darker, the more horizontal the more dark; and then darkest of all will be the holes in the building, such as open windows, doors, &c. We thus have a gamut from white to dark, whole masses of white, small specks of dark, capable of being variously expressed in different mediums, each with its advantages and limitations. I can only here very briefly refer to pen and ink, we can leave the paper for the white and use graded pens for the rest, as explained in Chapter I.

It is quite impossible to get anything like the number of greys we can see; our best pen and ink men generalise into light, two or three half tints, and dark. You can let the paper represent the sky, water, if smooth and reflective, roads, sides of buildings, and objects in light, make grey tones by ink lines of different thickness and different widths apart for the parts in shade, and use a few flecks of Indian ink for open windows or doors or other telling points of the picture; the open doorway won't all be Indian ink, reserve the ink blot for a very small portion of it, and work a dark grey into it so that you can't see the original shape of the fleck of ink. By careful observation you will be able to see just where this darkest spot of dark should be placed in the doorway. Get your greys even, and if gradated, regular.

I will now give an alphabetical list of half-a-dozen of the men whose black and white work calls for the most careful study. Raffles Davison, Mallowes, M'Gibbon, Pennell, Railton, and Daniel Vierge, especially in his illustrations of "On the Trail of Don Quixote." Then many illustrations in the technical journals, the earlier volumes of *The Architectural Review*, *The Studio*, *Harper's*, and a few high-class magazines, show the work of other men with something to teach in the way of draughtsmanship. There is a great tendency to-day to discard outline as much as possible, and there is much to be said for it, but the whole art of pen and ink is not necessarily in this direction; our chief aim should be to sketch to record facts, to help get them in our memory; but we can do this as artistically as possible.

Sunlight must be sketched as it is, lightly outlining the shade in pencil and greying it deliberately, to preserve the same o'clock truth. You can't be doing this for hours together, so only work up that part of the sketch which you can get done while the effect lasts. A part of a sketch finished by putting in what you can see, and that only, is far more valuable than one more continuously worked on.

The plum effects, as I have heard artists call them, are often very transitory, and have to be watched and waited for. When represented faithfully, or rather well suggested, they are on a higher level than the everyday effects. The top lights and under darks are always to be seen, but when Nature is picture making, with the first hour or two and the last hour or two of the sun's rays, she cunningly blends light into light and dark into dark, giving now breadth, now sparkle; and it is from the study of these effects that a few men are able to stand beyond their fellows in their representation of things; and for these effects you must watch, and then deeply study and earnestly try to understand some little of the subtlety you will see. And from such studies, according to your diligence and perception, you will be able to gain individuality in your work, being always cautious that your individuality shall contain as many of Nature's truths as possible, or an objectionable mannerism may be your reward.

A life of study brings most of us back to the love of simplicity, also shown so much in the Antique, and I certainly suggest short courses of drawing from the life and from the Antique, not only in our student days, but throughout one's career, as a corrective to the love of elaboration which from time to time breaks out in serious epidemic form, and spreads over whole districts. If more than half the cornices, string courses, window dressings, and other enrichments, and more than three-quarters of the carvings and pot ornaments were removed from our street architecture, how very much better the streets would look. As a matter of fact, they harbour dirt, cut up and belittle the effect, and are really only vulgar ostentation which might with advantage be heavily taxed. No wonder a few daring architects, some of them deep students of ornament, keep their buildings on the outside as plain as a barn, in direct opposition to this excess. In turning over some old notes I made at the first Art and Craft Exhibition, now a good many years ago, I find, "The furniture is not covered with mouldings, turnings, and carvings, but mostly shaped to a convenient form, much as we find in some of the higher works of Nature." Now I think this short student criticism I then made will aptly apply to some of the best architecture of to-day. Plain surfaces predominate, relieved by splays and segmental forms; many of the hard corners are slightly rounded off, deep under darks are more sparingly used, and reserved for effective positions; buildings are arranged in fewer parts; one well-designed cornice is now often considered enough for one building; the ornament is much concentrated, and of a very much higher order, and many other similar points towards simplification are evident in the works of some of the best architects of to-day. The two sources of study in the world are Nature, and the works of those men and schools of men who have gained their knowledge from Nature. These sources are safe to study and follow, from them we may get inspiration and a chance of formation of style, but we must at the same time keep our minds ever open to investigate new ideas, for with the education of greater numbers we ought to get new light on many subjects, and may reasonably anticipate for the future greater results than we have had in the past.

Diagrams A, B, and C are to $\frac{1}{4}$-inch scale (*i.e.*, each $\frac{1}{4}$ inch = 1 foot; or $\frac{1}{48}$ full size).

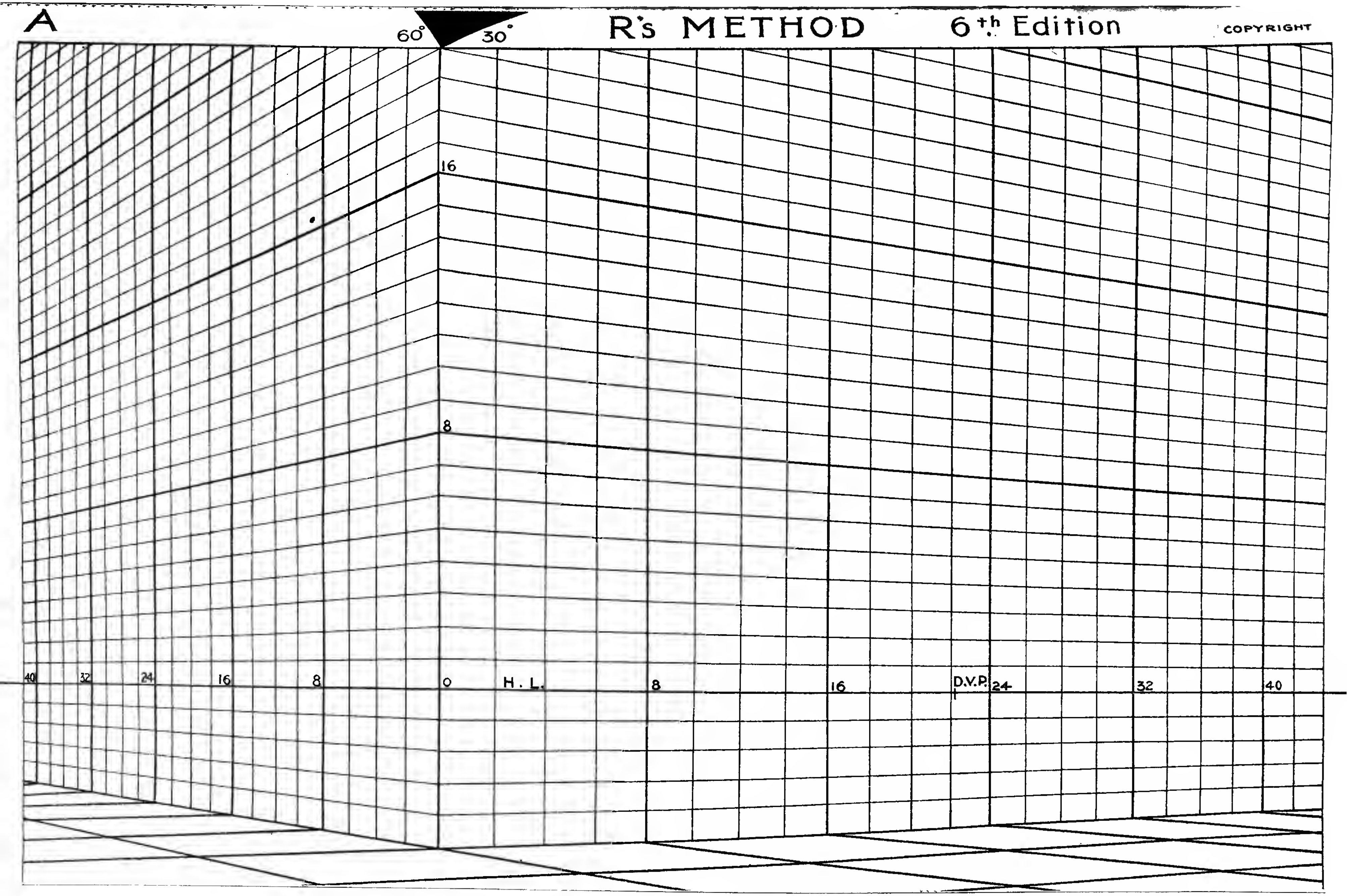
As the spectator comes nearer to the building he can see less of it, but can draw that part in view to a larger scale.

The position of the spectator is taken at 20 yards (15 inches to $\frac{1}{4}$-inch scale) from the nearest angle; so for a drawing coming up to the space under 16 on the nearest angle, that is 20 feet high, the distance of the spectator will be three times the height away. A drawing coming up to the top division but one will be 24 feet high; for this sketch the spectator will be two and a half times the distance away.

The following key shows how the diagrams may be used for varying scales.

Estimated Height of Building or Object about	Distance to stand away from nearest Corner.	Height of Space on Diagram.	Width of Space on Diagram.	Scale.
Ft. In.	Yards.	Ft. In.	Ft. In.	
80 0	80	4 0	8 0	$\frac{1}{16}$ in. to a ft.
40 0	40	2 0	4 0	$\frac{1}{8}$ ”
20 0	20	1 0	2 0	$\frac{1}{4}$ ”
10 0	10	0 6	1 0	$\frac{1}{2}$ ”
5 0	5	0 3	0 6	1 ”
2 6	$2\frac{1}{2}$	0 $1\frac{1}{2}$	0 3	2 ”
1 3	$1\frac{1}{4}$	0 $0\frac{3}{4}$	0 $1\frac{1}{2}$	4 ”

Extended and intermediate scales can be worked out if required.



This is a Specimen Diagram (A) from R.'s "Method" (6th Edition), and the majority of the Plates have been drawn over it.